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October 1, 1926
25 Cents

Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

The Frigidaire Sales Franchise means an *ever widening extension of Service* to Public Utility Companies

MORE than 250,000 Frigidaire electric refrigerators are now increasing the profits of Public Utility Companies.

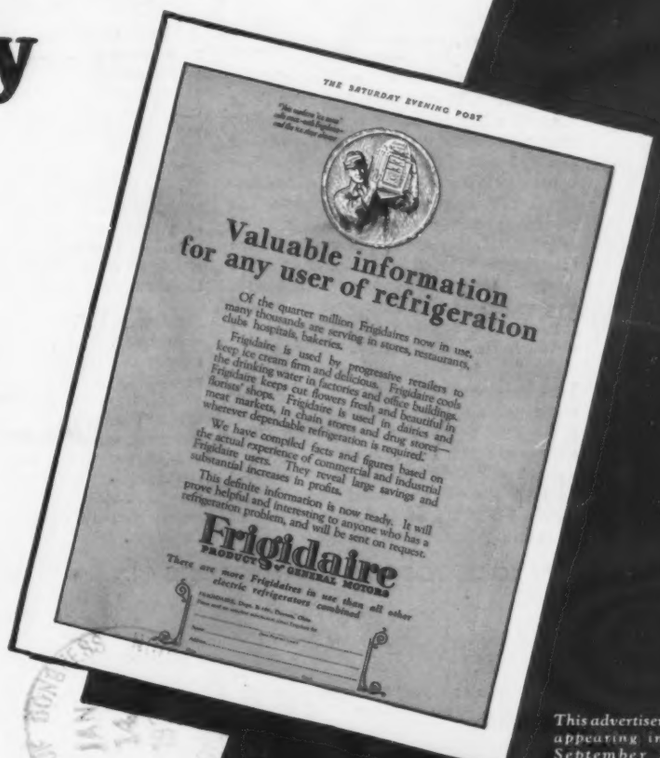
In the commercial field alone there are more than 60,000 Frigidaires.

And the growing need for lower operating costs is rapidly directing the attention of thousands of merchants, who are now using ice, to Frigidaire—is making every commercial user of refrigeration a Frigidaire prospect.

This ever growing interest in Frigidaire means that the Public Utility Company, holding the Frigidaire franchise, will continue to experience a steadily increasing demand for Frigidaire commercial units and, consequently, a highly satisfactory outlet for additional current.

Full details of the immediate possibilities offered Public Utility Companies in the Frigidaire commercial field will be mailed upon request.

FRIGIDAIRE
Dept. N-54, DAYTON, OHIO


THE SATURDAY EVENING POST

Valuable information for any user of refrigeration

Of the quarter million Frigidaires now in use, many thousands are serving in stores, restaurants, clubs, hospitals, bakeries.

Frigidaire is used by progressive retailers to keep ice cream firm and delicious. Frigidaire cools the drinking water in factories and office buildings. Frigidaire keeps cut flowers fresh and beautiful in florists' shops. Frigidaire is used in dairies and meat markets, in chain stores and drug stores—wherever dependable refrigeration is required.

We have compiled facts and figures based on the actual experience of commercial and industrial Frigidaire users. They reveal large savings and substantial increases in profits.

This definite information is now ready. It will prove helpful and interesting to anyone who has a refrigeration problem, and will be sent on request.

Frigidaire
PRODUCT of GENERAL MOTORS

There are more Frigidaires in use than all other electric refrigerators combined.

This advertisement, appearing in the September 25th issue of The Saturday Evening Post, reaches hundreds of thousands of commercial prospects for Frigidaire.

Frigidaire
PRODUCT of GENERAL MOTORS

This End Grain Fibre

Makes Rockwood Paper Pulleys Grip Hardest and Slip Least

Forty years ago— in the early days of power driven machinery, Rockwood conceived the idea of a better belt pulley—a pulley that would transmit more power—*a pulley built of paper!* By compressing layer upon layer of tough, wear-resisting fibre with the end grain exposed as a surface to grip the belt—Rockwood *originated* the paper pulley. Its success was immediate. And today that same pulley—constantly improved through the years—is the accepted standard for electric motors and other high grade belted machinery.

But Rockwood was not satisfied! Innumerable pulley sizes manufactured after receipt of the order and then shipped from the factory necessarily meant slow deliveries. And dealers had to tie up too much money in stock. So 2194 of the more popular sizes in a phenomenal range of 1½ to 14 inch diameters were selected and manufactured in quantities. These 2194 *standardized* pulley sizes were then mobilized in service stocks from coast to coast, each pulley packed ready for instant demand. Now you, Mr. Dealer, can get immediately from a nearby service stock the Rockwood Paper Pulley of the size required. No waiting for the pulley to be made special after the order is received—no waiting for a factory shipment—no stock to carry —no money tied up—no disappointing your customer.

Rockwood Paper Pulleys and Rockwood service have set a standard unapproached by any other pulley manufacturer. You may telegraph, telephone or write for the Rockwood Paper Pulley called for—and in a few hours at most it will be in your hands. Order from the nearest store listed on this page, giving diameter of pulley wanted, width of belt to be used, size of shaft and dimensions of keyway in shaft.

THE ROCKWOOD MANUFACTURING CO., INDIANAPOLIS, U.S.A.

SERVICE STOCKS
from Coast to Coast

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Sager-Spuck Supply Co., 364-66 Broadway.
ATLANTA, GA.—All Sizes 1½ to 12 in. dia.
Fulton Supply Co., 70 Nelson St.
BALTIMORE, MD.—All Sizes 1½ to 10 In. dia.
Carey Machinery & Sup. Co., 119 E. Lombard St
BIRMINGHAM, ALA.—All Sizes 1½ to 8 in. dia.
Matthews Electric Supply Co
BOSTON, MASS.—All Sizes 1½ to 14 In. dia.
Olmsted-Flint Corp., Cambridge.
BUFFALO, N. Y.—All Sizes 1½ to 10 In. dia.
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Doermann-Roehrer Co., 450 E. Pear l St.
CLEVELAND, OHIO—All Sizes 1½ to 14 In. dia.
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DALLAS, TEXAS—All Sizes 1½ to 14 in. dia
Southwest General Elec. Co., 1801 N. Lamar.
DENVER, COLO.—All Sizes 1½ to 8 in. dia.
Hendrie & Bolthoff Mfg. and Sup. Co., 1635 17th.
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Julius Andrae & Sons Co., Broadway and Mich.
NEW ORLEANS—All Sizes 1½ to 8 in. dia.
Woodward, Wight & Company
NEW YORK CITY—All Sizes 1½ to 14 in. dia.
Rockwood Paper Pulley Stores, 6 Murray St.
OMAHA, NEB.—All Sizes 1½ to 8 in. dia.
Interstate Mchy. & Sup. Co., 1006 Douglas St.
OKLAHOMA CITY, OKLA.—All Sizes 1½ to 8 in. dia.
A. W. White, 424 West Reno St.
PHILADELPHIA, PA.—All Sizes 1½ to 14 In. dia.
Charles Bond Company, 617 Arch St.
PITTSBURGH, PA.—All Sizes 1½ to 12 in. dia.
Transmission & Belting Co., 325 Second Ave.
ROCHESTER, N. Y.—All Sizes 1½ to 8 In. dia.
Rochester Electrical Sup. Co., 240 St. Paul St.
SALT LAKE CITY, UTAH—All Sizes 1½ to 8 in. dia.
Capital Electric Co., 310 W. Second South St.
SAN FRANCISCO—All Sizes 1½ to 20 in. dia.
Bussell Electric Works, 130 8th St.
SEATTLE, WASH.—All Sizes 1½ to 14 In. dia.
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Syracuse Supply Company, 314 W. Fayette St.
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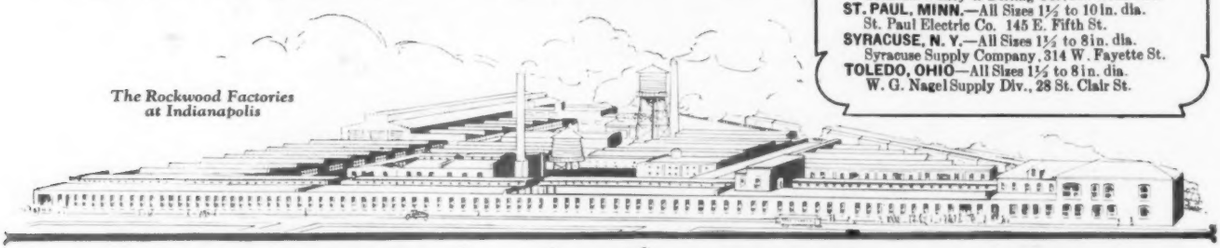

The Rockwood Factories at Indianapolis

ROCKWOOD *Instant* PULLEY SERVICE

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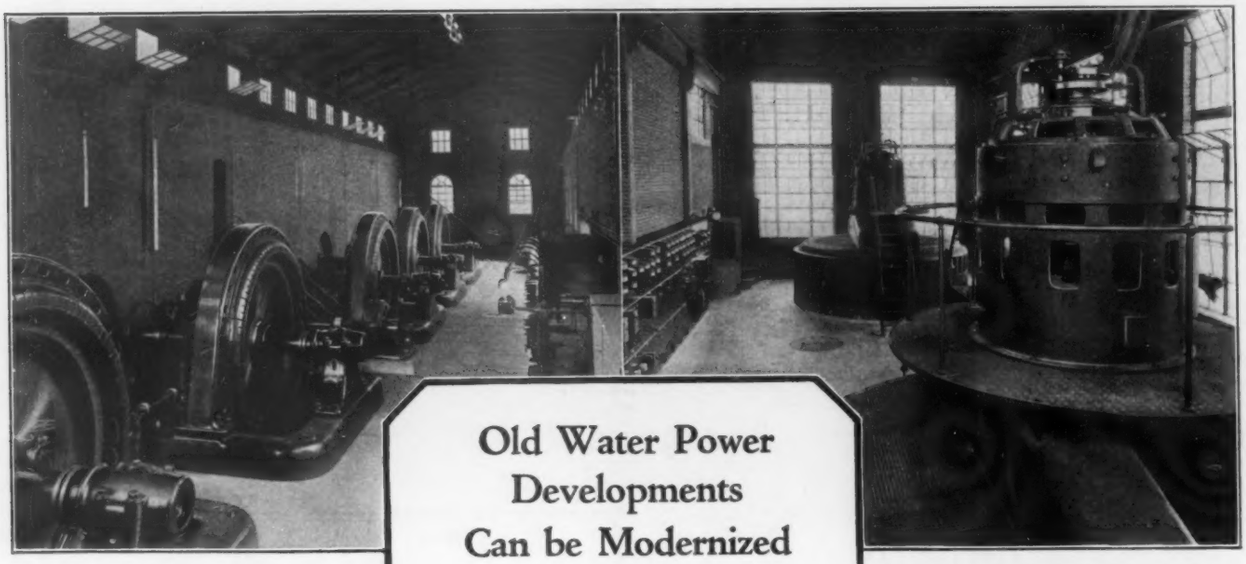
Keeping Data for Industry

ONE of a trade journal's prime functions is the collection and compilation of data and statistics with reference to the industry which it serves. In the performance of this function the McGraw-Hill Publications take the lead. Approximately 15,000 sources of information are consulted constantly; 220,000 subscribers constitute a further source and 41 McGraw-Hill men devote their time to the compilation and correlation of this information.

Among the data which are offered annually to its subscribers the Journal of Electricity presents figures on the construction and merchandising programs of the central stations, the growth in production and consumption of kilowatt-hours and the growth in number of central station consumers. It also compiles data dealing with the total merchandise sales of the electrical industry in its territory and the proportion which passes through the various trade channels. This is only one of the many services which are offered readers.

These data, however, are used for another purpose. From this storehouse of information and the experience gained in collecting it the McGraw-Hill Company has perfected a rating of industrial markets and a formula for reaching them efficiently . This knowledge is summed up in the McGraw-Hill Four Principles of Industrial Marketing which are explained more fully in the advertisement on pages 38 and 39 of this issue. Information will gladly be furnished on either these principles or on the data service to anyone who is interested in inquiring.



BEFORE RECONSTRUCTION
4800 K.W.

Old Water Power Developments Can be Modernized with Profit

AFTER RECONSTRUCTION
7200 K.W.

BY redevelopment of existing water power plants, our engineers have assisted the Manchester Traction, Light and Power Company in substantially increasing generating capacities and plant efficiencies. The capacity of one plant was increased from 4800 kw. to 7200 kw. with an increase of 25% in plant efficiency. In another plant the efficiency was increased 50%.

The opportunity to utilize interconnected water power to carry the peak load of steam plants demands that the reconstruction of old water power plants receive the closest study. Our engineers are prepared to assist all such investigations.

STONE & WEBSTER

INCORPORATED

DESIGN · BUILD
OPERATE
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BOSTON, 147 MILK STREET
NEW YORK, 120 BROADWAY
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PITTSBURGH, UNION TRUST BLDG.

EDITORIAL

Helping the Farmer to Make More Money

UNDER the appealing title, "How to Make More Money on the Farm," the Puget Sound Power & Light Company has prepared a booklet describing the various applications of electricity on the farm for its present and prospective rural customers. The story of what electricity has done for industry in increasing production and decreasing costs is told briefly and clearly with the statement that the proper installation of power and machinery on the farm multiplies man-power, saves money and brings increased prosperity. The major story is told largely in pictures. While conceivably the electrical industry cannot run the farmer's place for him, it can and should show him what electric power and electric machinery will do to lighten his burdens and improve his living conditions. The publication and distribution of this booklet is a step in the right direction.

Nippon Feels the Public Ownership Urge

JAPAN, leader among oriental nations in the development of its power resources, is beginning to experience the customary public ownership urge which follows the successful pioneering and establishment of going enterprises the world over. After the real work of achievement has been accomplished, and any enterprise may be considered certain of its right to existence, along comes the usual agitation for government operation of that enterprise. Japan is learning this in its electrical industry, even as America has found it these last few years.

In the naive translation of the Japanese language into English, the problem is stated as follows in "Denkinotomo" (the Electrician's Friend), a Japanese trade publication:

> The national unification of electric power has recently become an important theme in political circle. Members of Upper and Lower Houses are urgently advocating the creation of investigation committee for this purpose. It is expected that some measure will be introduced in coming Diet. National ownership is looked upon to be very difficult, if not impossible, owing to the vast amount of capitalization. The creation of a big transmission company subsidized by the Government is thought to be more realizable as a first step at least.

Japan might well look upon the experience of European countries with government ownership of utilities before embarking upon such an enterprise, realizing that her present industrial development has been due, as in America, to the play of private initiative allowed those who have established industries.

The spectacle of European nations, writhing in economic death throes, and desperately struggling to recover the status of pre-war currency, throwing off, one at a time, the governmental operation yokes which are throttling them, is a spectacle which Japan or America might well look upon as a terrible lesson. The sight of Germany recovering her economic status, slowly and yet soundly, since she has turned back her devitiating railroads to the sterner discipline and more economic management of private enterprise; the brave struggle of little Belgium to regain its feet by similar means; and the rigid, heroic measures employed by Fascisism in Italy along similar lines, that Italy may pay its debts by reducing unnecessary government expenses of all kinds, even to the costs of elections; while France, unwilling to face the facts of an ever increasing governmental burden, is milling about in a chaos which may yet strangle it,—these are spectacles which should serve as horrible examples to a nation enjoying prosperity as a result of private initiative and enterprise.

A Company Earns a Tribute From its Own Country

THE old saying, "a prophet is not without honor, except in his own country," has been taken as an axiom for so long a time that a new concept is all the more surprising for it. Yet the real measure of a man, or an institution, is what his intimate neighbors think of him. The measure of success of public relations of a power company, surely, is to be found in what the people it serves thing of it.

In this respect the commendation and approval of those in the community themselves in a position to appreciate the service rendered is a tribute well worth earning. The Washington Water Power Company finds itself in this happy position within its own community, it was brought out in a recent incident.

At a directors' meeting of a banking organization in Spokane, when the matter of service was mentioned the president gave it as his opinion that his institution could well afford to emulate the wonderful service record made by the power company. He went on to describe some of the special and unusual services that had been extended him as a customer, and when he had finished the other directors are said to have confirmed him in his statements and added their own tributes to those he had made.

Not long ago in these columns the opinion was ventured that there were three kinds of public relations. The first was negative, wherein the com-

pany was receiving complaints. The second was neutral or complacent, where no complaints were being received—a condition which was neither very favorable nor unfavorable, only dangerous. But the last was that state in which customers spontaneously declared themselves in terms complimentary to the company and were anxious to show their appreciation of the service they were receiving.

Clearly the case just mentioned falls into the latter and very much to be desired classification, the category denoting public relations of which a utility may be proud.

A.I.E.E. Holds Notable Convention at Salt Lake

AN unusually good program in which subjects relating to the transmission and control of electrical energy, lightning studies and discussions of engineering education played an important part, featured the Pacific Coast convention of the American Institute of Electrical Engineers just held at Salt Lake City. There were several outstanding contributions to the art and many fine discussions. A happy division of subjects on the program between technical and practical increased the interest in the convention, and set a new standard for meetings of this character. Perhaps the outstanding feature of the convention was the banquet at which Dr. Harris J. Ryan of Stanford University, past president of the Institute, was presented with the Edison Medal by President Chesney. Because of the high esteem in which Dr. Ryan is held by both members of the Institute and by the electrical profession this ceremony was a most impressive one. For those who could not attend the convention and to refesh the memories of those who were present a complete report of the sessions will be found on another page of this issue.

Glenwood Convention Points to Commercial and Sales Problems

REMARKABLE unanimity of opinion that the central station's sales and commercial programs and policies must be revised and broadened to meet present and anticipated conditions in the industry has been the outstanding development of the various regional meetings of the N.E.L.A. here in the West this year. The Glenwood convention of the Rocky Mountain Division, the last to be held, fell in line with the Los Angeles and Spokane meetings. There, as in the two earlier conventions, the subjects which received major attention related to sales and commercial efforts and to public relations.

Among the defects of the industry's selling structure brought out at the Colorado meeting were the fact that the number of appliances sold is not keeping up with the number of customers added and the fact that the $125-a-month salesman with a correspondingly low calibered sales manager is not capable of handling the central stations' $12,000,000 a year sales quota. It was further brought out that the power company's sales efforts must include taking the merchandise to the customer's home in selling and that merchandising itself is secondary to an increased production and sale of kilowatt-hours.

It is to be sincerely hoped that the facts brought out in the papers and discussions at the important conventions this summer will be taken to heart. With the commercial and public relations problems holding the center of the stage at three meetings it is conceivable that something is radically wrong with the structure or operation of these departments. There will be no correcting of the ailments, however, if those who attended the conventions go home and immediately forget these important problems in the petty cares of their own particular jobs.

Aesthetic Notions and the Moving of Poles

IN the engineering departments of some power companies, life is just one pole moving request after another. Because there is such a thing as a desire to get along with the public, these requests have to be taken seriously. Usually a man has to spend a good part of the day going over the situation, finding the objecting property owner, surveying the situation with respect to relocating the pole, and making his report. Then, if the case is carried through, a line crew spends another part of another day relocating the pole, transferring the leads, services and necessary guys. All told, the job of relocating the pole runs into some considerable expense.

But it is the underground advocate who is the most lavish in his desires to spend someone else's money, for that is what it amounts to in the long run. The cost of moving poles and running services underground must be borne by the entire system, must be considered in rates charged for service. Yet the aesthetic taste of some school principal who thinks a pole or two on the street ruins the view of the new school, the fussy householder who builds a modest mansion without thinking of the pole on the street until the house is finuished and looks out at his prize view obstructed by the presence of a creosoted cedar tree trunk—these immediately clamor for underground service.

In the pole moving situation there is the opportunity for more grief, or more expense, or more goodwill than probably any other situation. The company which is "hard boiled" and does not take the time or trouble to be diplomatic is the one which earns the grief. The company which in its anxiety to still public disfavor moves poles at the slightest provocation, is the one getting the unnecessary expense.

But the company which seizes upon each such request as a distinct opportunity to do some proselyting of good will, and makes the customer understand that the pole can be moved probably, and that if he desires it very greatly he will be wliling no doubt to assist in the cost of moving the pole, can accomplish two things. It can bring a realization of that indivual that moving poles, or any other such work, costs a great deal, and that if it is

done for nothing, its cost will have to be absorbed in rates.

The second accomplishment will be that the number of such pole movings shall be cut down to a minimum, and yet those objecting to poles as scenery will understand and learn to look the facts as well as the poles in the face without a wry taste or an injured aesthetic air.

Take the Appliance from the Gift Class

"HOW lovely!", exclaims Mrs. Housewife, as she receives the gift of a beautiful electric percolator set at Christmas, "but it is really too pretty to use."

And so she places it prominently on the dining-room buffet as a new decoration for her home. When spring brings her news that Cousin Esther is about to be married, her concern over what to give as a wedding present ends when her eye chances to fall upon the percolator set. Cousin Esther, now happily married, let us hope, entertains a number of friends at bridge. What shall she give as a prize? Oh, yes, the beautiful percolator set that she has never used and knows she will never want to spoil by using. And so the percolator set again is placed in circulation.

It is not inconceivable that through being shifted thus from one family to another the percolator set may in time be regiven to Mrs. Housewife, who first sent it upon its travels. The percolator set may eventually wear out—but hardly from use as a percolator.

Thus many too beautiful appliances finally wind up, after weary rounds of traveling, in someone's attic or on a closet shelf, never having known the joy of turning a meter.

The trouble with this sort of thing is that it is not only the central station which suffers from the too beautiful appliance that is constantly regarded as a gift and not a thing of usefulness. The manufacturer of the appliance suffers, too, since instead of five or six sales he makes but one sale of an appliance which from that time on frequently is given but seldom if ever used.

A census of the average home would reveal that a large percentage of electrical appliances had reached there as birthday, Christmas, wedding or anniversary gifts or else that somebody had been lucky at bridge. These appliances are to be found either on a shelf in the closet or upon the buffet as dining-room decoration. The old ditty of farm life, "Nice pictures of fruit on the dining-room wall, but no sign of fruit on the table at all," finds a sadly true paraphrase in the situation of electrical appliances in many a home.

While there is no denying the market of appliances as gifts, a market which by all means should be kept alive, there is a place today for the appliance which appeals by its usefulness and its reasonable cost. The public needs to have its point of view changed so that it will regard electrical appliances not as luxuries and gifts but as tools.

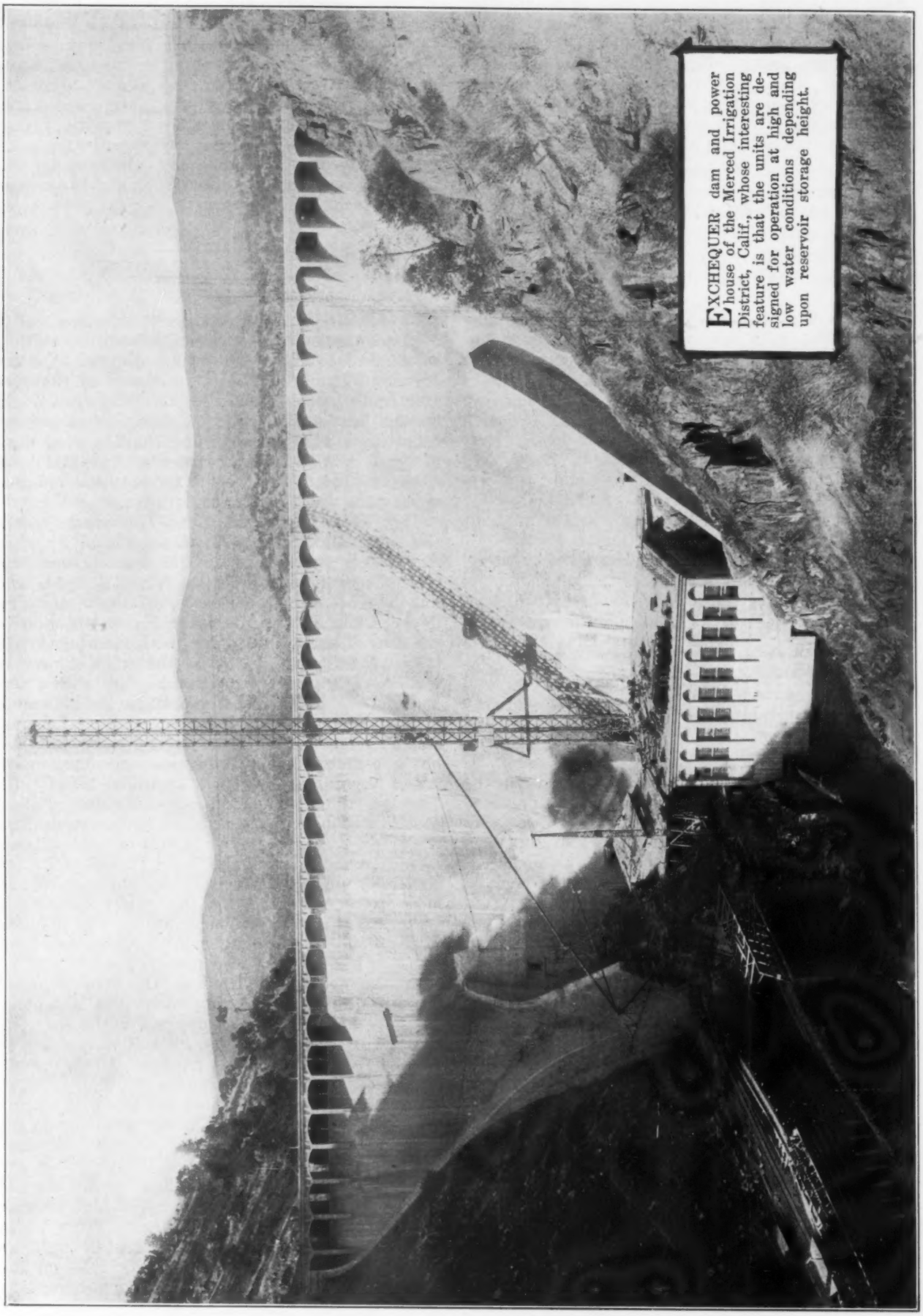
When it is possible, through exercise of the genius of production for which America is famous, for the man of the family to walk into a store selling electrical appliances with a five-dollar bill and come out with the appliance under his arm instead of merely a receipt for the first payment, then the appliance will attain something of the acceptance of the flivver, the gas range, the typewriter, or any of those things which today are regarded as indispensable tools of modern living. In that day the appliance manufacturer, the dealer and the central station each will enjoy greater benefits from every appliance sold.

Dedication of the New Ryan Laboratory

CALIFORNIA'S precedence in the development of high tension transmission has been more firmly established as the result of the dedication of the Harris J. Ryan Electrical Laboratory at Stanford University on Sept. 17, 1926. With two high-voltage laboratories, with the lines of two utilities operating at 220,000 volts and the line of a third designed to operate at this potential, this state now ranks as the seat of high tension research and application.

The dedication of the Ryan Laboratory marks the culmination of the dream of a man who has played a prominent part in the transmission progress of the industry. To. Dr. Harris J. Ryan, who has just been accorded the signal honor of being awarded the Edison Medal for his contribution to the science and art of high tension transmission of power, must go the honor for the establishment of the laboratory. His experiments, first with reference to the relation of temperature to resistance in insulators and later with corona effects, not only had a great bearing upon transmission progress but also brought out the necessity for the laboratory. Negotiations begun in 1921 have borne fruit. Through the co-operation of university officials, power companies, manufacturers and other utilities the dream of five years ago is now an accomplished fact. Ground and building were furnished by the university. The transformers and auxilliary equipment were furnished by the power companies, manufacturers and telephone utility. In addition to the building and equipment provision has been made for a 9-mile test-transmission line.

At the dedicatory exercises Dr. Ryan himself tersely outlined the bearing which the laboratory will have upon the future progress of the electrical industry. Briefly summed up his statements showed that by 1935 all of the water powers within present economic transmission distance of the Western market centers will have been developed. To bring in the immense amounts of power available on the Colorado, Columbia and other Western streams, higher transmission voltages will have to be employed. Before this can be done advances must be made in the technical knowledge of high voltage. Many of the requisite researches to bring about these higher voltages will be conducted in the Ryan Laboratory. Thus the laboratory will be an important link in the chain of Western progress.



EXCHEQUER dam and power house of the Merced Irrigation District, Calif., whose interesting feature is that the units are designed for operation at high and low water conditions depending upon reservoir storage height.

Another Low-Head Plant for California—Exchequer Utilizes Irrigation Waters

By A. A. Blakesley

Chief Engineer, Merced Irrigation District, Merced, Calif.

CONSERVATION of flood waters of mountain streams is the keynote of California's continued agricultural development. That electric power can be developed profitably as a by-product in the face of adverse electrical operating conditions is one of the interesting features of the Exchequer project of the Merced Irrigation District.

ELECTRICAL energy is a by-product as far as the Exchequer project of the Merced Irrigation District, Calif., is concerned. The project is located on the Merced River some 35 miles northeast of Merced, directly on the main line of the Yosemite Valley Railroad. The prime object considered was the procuring of an adequate supply of water to permit and facilitate the continued agricultural expansion and development of the district. The district comprises 189,682 acres of land in the general vicinity of Merced.

Power equipment was installed solely for the purpose of extracting a maximum revenue from the water as it passes the dam and as long as the water level is high enough to drive the turbo-generators. Under average conditions the reservoir will start to fill in February and will be completely filled by May. This statement is based upon the results of a long-period survey of the river characteristics and upon estimates of normal water consumption by the district. It is contemplated that the plant will operate at full load during about five months of the year and at varying degrees of partial load during a period of about four months. This means that the plant will be completely shut down during some three months of each year. Of course these are estimated average conditions and will vary from season to season depending upon precipitation and other uncontrollable conditions and upon the demand for irrigation water by the district.

A drainage area of 1,076 sq. miles ranging from a minimum elevation of 400 ft. to a maximum of 13,090 ft. supplies the Merced River. The estimated average precipitation over this area is 39 in. per annum which results in run-off conditions as indicated in the hydrographs shown in Fig. 1. River flow varies from a normal minimum of 90 sec.ft. to an average maximum of 6,000 sec.ft. with yearly peaks running as high as 15,000 or 18,000 sec.ft. The maximum recorded within the past 18 years is 37,200 sec.ft. as shown in the chart for January, 1911. The average total annual run-off is 960,000 acre-ft. of which the Exchequer reservoir is capable of storing 289,000 acre-ft. Its average depth is 106 ft., maximum depth 330 ft., its area 2,700 acres and its length 12 miles.

Demands for irrigation water begin to be felt in April of a normal year and continue through to November, reaching a peak in the month of June. These demands at the present vary from a minimum of 400 sec. ft. to a maximum of 1,300 sec.ft. From this and from the hydrographs may be seen the great advantage of the 289,000 acre-ft. storage provided by the Exchequer dam which holds this amount of water over from a useless to a useful period.

As mentioned in the first paragraph the hydroelectric plant built in conjunction with the Exchequer dam is merely to extract as much revenue as possible from the passing water. Considering that the project was necessary from an irrigation standpoint the fixed charges placed against the generating plant are small. The total investment in the power house and equipment is approximately $900,000. Considering a normal return of $110,000 necessary to carry interest, depreciation, maintenance and operating costs, everything over that amount will be available for assisting the district to meet the costs of its other developments. Considering further that the plant operates the equivalent of seven months at full load with a load factor of 60 per cent and a power factor of 80 per cent the total gross return will be in the nature of $300,000 annually. Thus the power development is justified from an investment viewpoint under existing conditions in spite of the adverse operating schedule from a power point of view.

Power is wholesaled at the generator switchboard thus relieving the district of any further obligation or responsibility. It is necessary that the power house be operated by the district in order that regulation of water according to district demands be given first consideration.

Dam

The dam is a gravity structure arched in plan on a radius of 674 ft. It is located at a comparatively narrow point in the valley of the Merced River about 7 miles northeast of Merced Falls. The entire area contiguous to the reservoir is underlaid with volcanic rock that seems to be impervious to moisture. Outcroppings at the damsite influenced the selection of that site for the purpose. Good founda-

tions and anchorages were available without excessive excavation. A transverse section through the dam and power house is shown in Fig. 2.

Foundations extend 27 ft. below the normal bed of the river to El. 376. The base of the dam proper rests at El. 384 and the spill crest at El. 693. Fourteen-foot gates raise the maximum water storage level to El. 707. The roadway across the top of the dam is at El. 710 and the balustrades are 4 ft. high, giving a total apparent height of 330 ft. Thickness at the spill crest is 12 ft. and at the base 220 ft. Clear width of the roadway is 16 ft. and the total width including the balustrades 21.5 ft. Excavation for dam and power house totaled 97,000 cu.yd. and the concrete placed totaled 396,000 cu.yd. Crest length of the dam is 960 ft. and base length 40 ft.

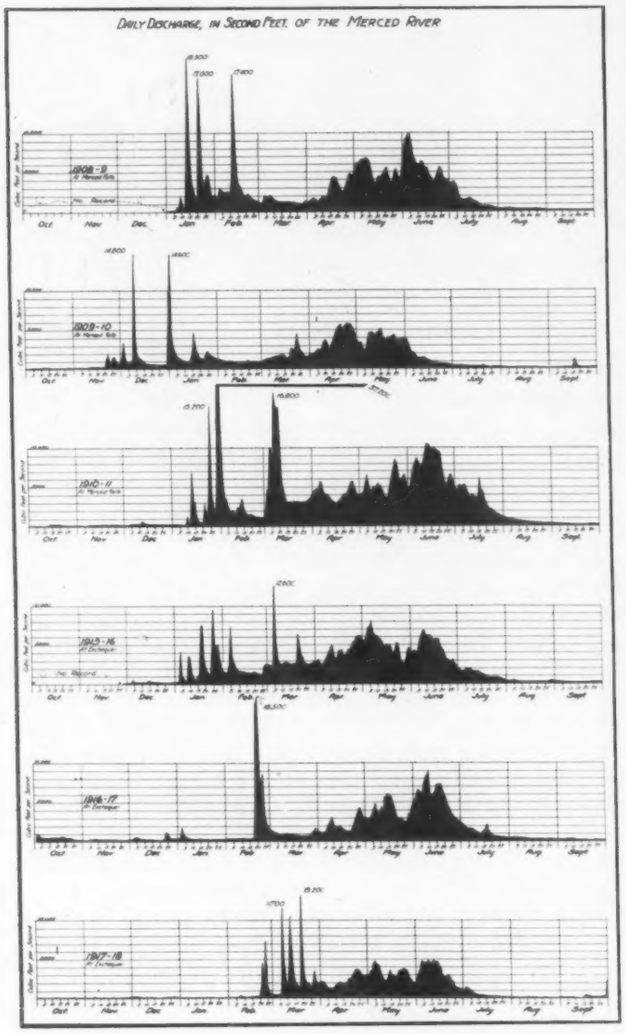


Fig. 1. Hydrographs showing flow characteristics of the Merced River.

Capacity of the over-pour-type spillway is 75,000 sec.ft., more than twice the greatest flood recorded on the river. It is divided into two sections, one located at each end of the dam. Each section is subdivided into 7 passages each controlled by a butterfly-type gate 3 x 14 x 24 ft. in dimension. These gates are built up of steel trusses and covered with steel plates. Method of installation and control is indicated in Fig. 3. The gates rotate through an angle of 90 deg. in a horizontal plane. They are actuated by an electrically driven operator mounted on a car. There are two of these operator cars, one for each end of the dam, each fitted so as to clamp to the track during the operating period. Outlets are provided at each operating position so that no trolleys nor long flexible conductors are necessary. Each gate weighs 18.8 tons.

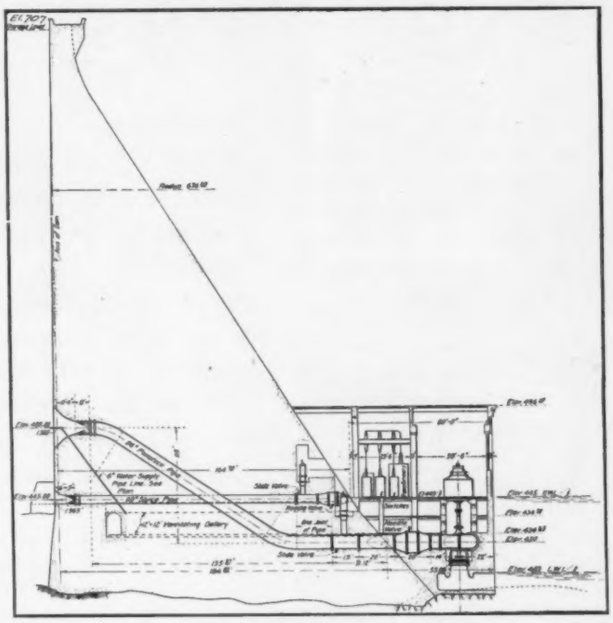


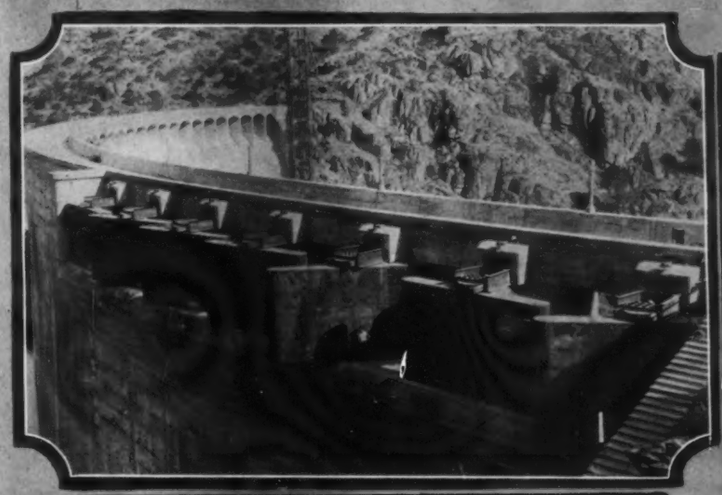
Fig. 2. Section through dam and power house showing relative location of equipment and giving various elevations.

A spillway channel down each end of the dam conducts the spillage to a point beneath and beyond the power house. Inspection galleries extend up through the dam from the level of the turbine floor to the crest at each end of the dam. These contain stairways and also serve as air passages for the power house.

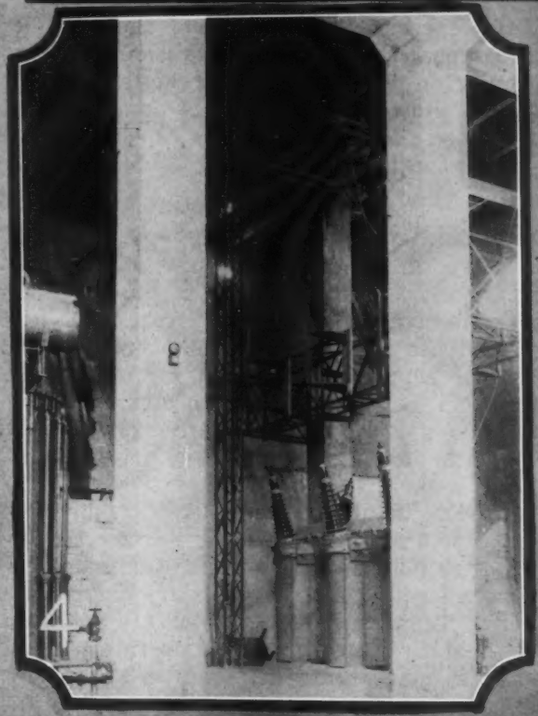
Construction

Because the dam is located in a narrow canyon which is also occupied by the Yosemite Valley Railroad, construction involved many difficulties. In iddition to extreme space limitation, work had to be carried on without interruption to the operation of the railroad. Thus the dam had literally to be built around the railroad until its track could be relocated. An average of 22 trains per day operated over the line.

Space limitations at the site of the construction plant made the storage of more than one day's supply of aggregate and two days' supply of cement infeasible. Aggregate bunkers were 450 ft. downstream from the mixing plant with the tops of bins level with the railroad tracks. A spur track ran over the bins which were supplied through bottom-dump cars. The mixing plant was immediately adjacent to the 475-ft. double compartment steel tower. Concrete was discharged through chutes



OF particular interest in the Merced Irrigation District's Exchequer plant are: (1) The butterfly spill gates showing their size compared with a man. (2) The generator floor as seen from the switchboard balcony. Two Westinghouse 15,625-kva. units compose the generator equipment. (3) The switchboard. (4) Indoor high tension bus and equipment may be seen here. (5) The oil pressure equipment for the Pelton governors, located in the basement. The power plant is located at the foot of the 330-ft. dam. Two Johnson valves allow the bypassing of irrigation water when storage water elevation is low.



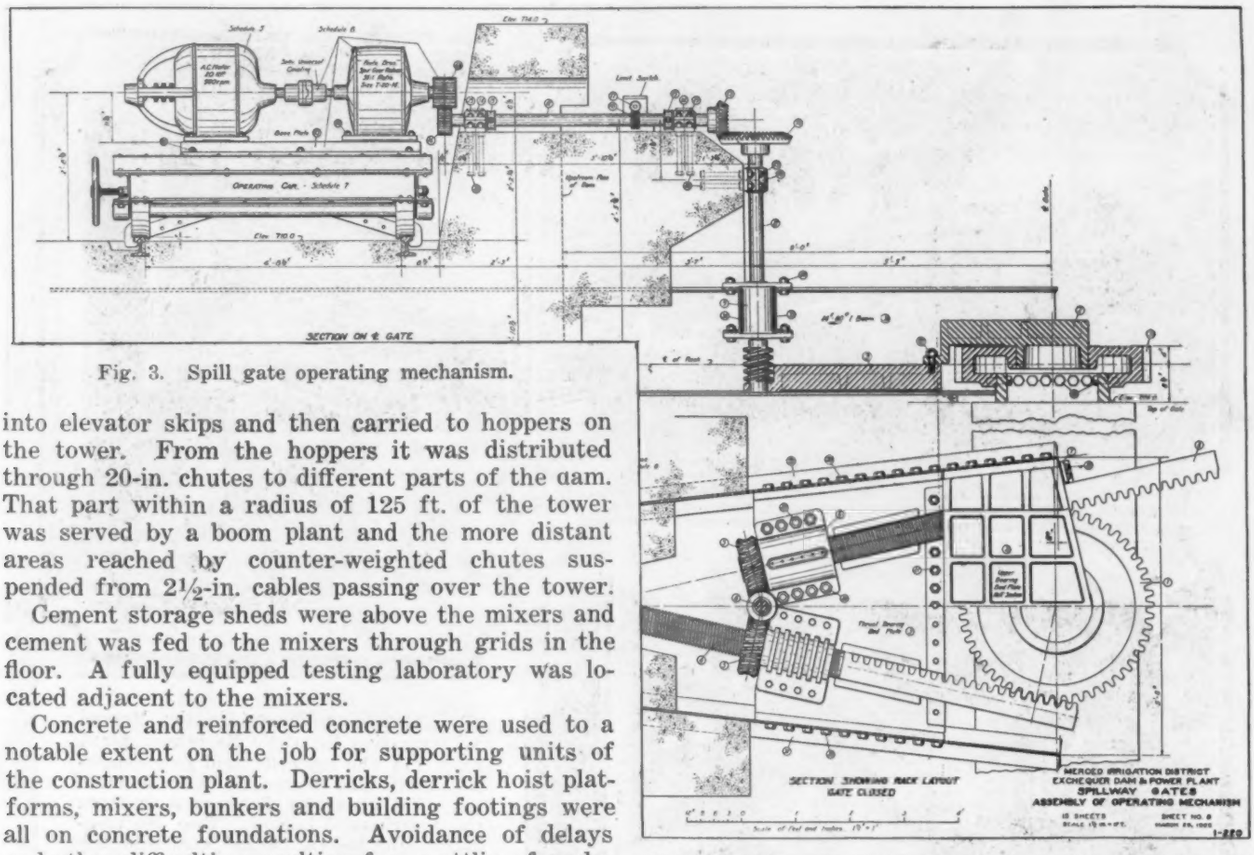

SECTION ON ℄ GATE
SECTION SHOWING RACK LAYOUT GATE CLOSED
MERCED IRRIGATION DISTRICT
EXCHEQUER DAM & POWER PLANT
SPILLWAY GATES
ASSEMBLY OF OPERATING MECHANISM

Fig. 3. Spill gate operating mechanism.

into elevator skips and then carried to hoppers on the tower. From the hoppers it was distributed through 20-in. chutes to different parts of the dam. That part within a radius of 125 ft. of the tower was served by a boom plant and the more distant areas reached by counter-weighted chutes suspended from 2½-in. cables passing over the tower.

Cement storage sheds were above the mixers and cement was fed to the mixers through grids in the floor. A fully equipped testing laboratory was located adjacent to the mixers.

Concrete and reinforced concrete were used to a notable extent on the job for supporting units of the construction plant. Derricks, derrick hoist platforms, mixers, bunkers and building footings were all on concrete foundations. Avoidance of delays and other difficulties resulting from settling foundations more than justified the extra cost.

Hydraulic Equipment

Hydraulic equipment is installed as indicated in Figs. 2 and 4. The main penstocks are 96 in. in diameter, intake at El. 485 and enter the turbine at El. 420. Where the two penstocks emerge from the dam into the power house there is installed a 76 x 96-in. oil-operated sliding gate valve, one in each line. Immediately beyond these gate valves the penstocks split, one line passing straight through to the turbine while the other diverges at an angle of 45 deg. to an axis 16 ft. from that of the main line and thence on through a 96-in. free-discharge Johnson by-pass valve. Between the branch point and the turbine in the main line is installed a 96-in. needle valve for controlling the water to the turbine wickets.

In addition to the penstocks there are two 60-in. sluice pipes intaking at El. 445 and discharging at the same elevation. These protrude through the dam adjacent to the power-house foundations, one at each side. At the discharge end of each is a 60-in. free-discharge Johnson valve. These sluice lines are for the purpose of passing irrigation water when the elevation of the storage water is below level of the penstocks.

All of these valves are motor-operated from control stations located adjacent to the valves themselves.

Turbines are of the Francis type, vertical reaction units, designed for variable heads. Each is rated at 24,500 hp. at 300 ft. operating head. This figure grades down to approximately 1,475 hp. at 95.5 head, which is considered to be the lowest head warranting operation of the plant. The draft tubes are split so that a section may be removed to permit runner repairs or replacements without disturbing in any way the generating or governing equipment.

Entire operation and control of the units is dependent upon the oil-operated governors. To insure continuity of service the oil pressure sets are installed in duplicate and each is arranged with a spare motor. Further, either is capable of supplying both governors.

Electrical Equipment

Generators are of the vertical type each rated at 15,625 kva. at 11.45 kv., 3-phase, 60 cycles, 257 r.p.m. Each is equipped with a 140-kw. 250-volt direct-connected exciter. No spare exciter is provided and the capacity of each is such that it is capable of supplying excitation for only one generator. No means of inter-connection is provided. However, for emergencies a spare exciter armature is carried in stock at the plant and may be installed with but a short shut-down.

To provide for differential protection all six generator leads are brought out and Y-connected within a protective housing on the generator frame. This provides a location for the necessary current transformers. Temperature indications are available at the switchboard through six temperature coils located at as many different points in the generator winding and connected to an indicating instrument at the switchboard.

Fire protection is provided in the form of water sprays located one at each end of the stator winding. The generators take their cooling air down through the inspection passages in the dam, drawing it through the windings and discharging the heated air into the generator room. Dampers are arranged so that the air flow through each generator may be shut off in event of fire, thus restricting combustion and aiding the water jets.

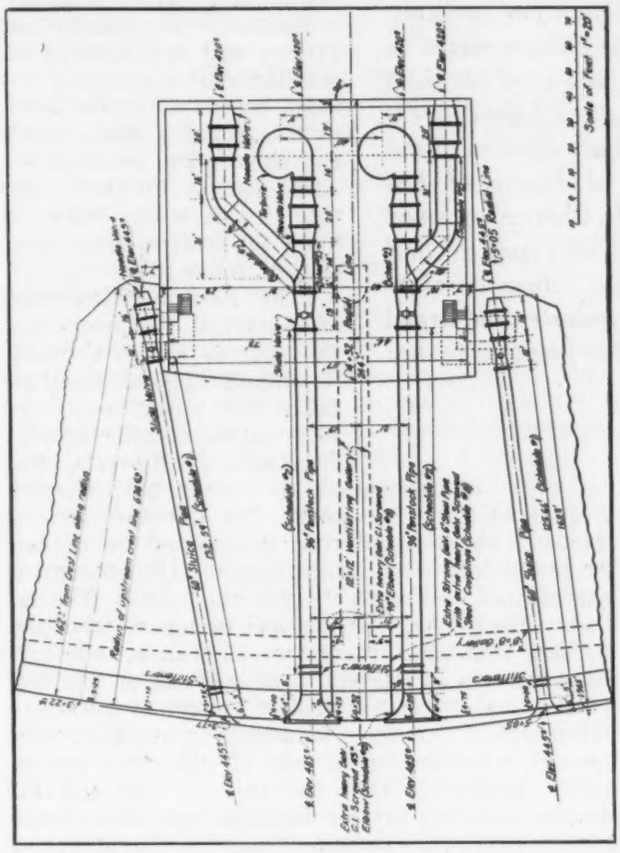


Fig. 4. Plan showing outlet pipes through dam.

Air brakes on each generating unit are capable of stopping the unit in less than five minutes with the field excitation entirely removed. Also these brakes are capable of lifting the entire rotating element of the unit a distance of 1in. to facilitate adjustment of thrust bearings. This is done with a unit pressure of less than 1,000 lb. per sq.in.

Each generator is connected to the 11kv. bus through duplicate oil circuit breakers rated at 1,200 amp., 11 kv., and having an interrupting capacity of 13,000 amp. at 11 kv. From this bus leads go directly to the low-tension terminals of the transformers. Station service is taken off of the 11-kv. bus through duplicate oil circuit breakers to a bank of 3-100 kva. transformers.

The transformer bank consists of three 10,400-kva., 11/110-kv. units and one spare. The bank is delta-connected and arranged for differential protection. The general arrangement of this equipment is indicated in the accompanying photographs which are largely self-explanatory, and from which detailed information may be gathered.

Direct current for control is supplied from duplicate storage batteries so arranged that either or both sets may be used at any one time. A 10-kw. motor-generator set is installed for charging purposes. A unique and useful feature of the battery installation is the fact that each battery is mounted on a suitable support, all cells on one level and at a height facilitating any maintenance or repair work. The height of the battery terminal lugs above the floor is about 30 in.

The operating gallery is located at the south end of the generator room and is fully open on the room side. The bench board is fitted with the usual control and indicating instruments and stands with its back toward the generator room enabling the operator to look through the board and watch the operating floor and equipment. Opposite the bench board and facing the operating room is a panel board carrying miscellaneous controls and instruments and the relays.

Both the motor-driven turbine valves and the motor-driven by-pass valves are controlled from the switchboard.

The guaranteed generator efficiencies are:

Full load	96.92 per cent
Three-fourths load	96.7 per cent
One-half load	96.0 per cent
One-fourth load	93.45 per cent

The guaranteed turbine capacities are:

Full gate	17,800 hp. at 88 per cent efficiency
0.9 gate	16,600 hp. at 89.5 per cent efficiency
0.8 gate	15,300 hp. at 89.5 per cent efficiency
0.7 gate	13,700 hp. at 90 per cent efficiency
0.6 gate	11,800 hp. at 88.3 per cent efficiency
0.5 gate	9,700 hp. at 85.5 per cent efficiency

Principal Equipment

The two 96-in. oil-operated slide-gate valves as well as the two 60-in. gate valves were supplied by the Llewellyn Iron Works, Los Angeles, as were the fourteen spillway gates. Two 60-in. Johnson valves and two 96-in. free discharge valves were manufactured by the Pelton Water Wheel Company, San Francisco. The 96-in. needle valves were supplied by the Wellman-Seaver-Morgan Company. The turbines were made by the I. P. Morris Department of Wm. Cramp & Sons Ship & Engine Building Corporation and generators by the Westinghouse Electric & Manufacturing Company. Switchboards, transformers, oil-circuit breakers and motor-generators were supplied by the General Electric Company and the disconnecting switches, insulators and miscellaneous power house equipment by the Electric Power & Equipment Corporation.

Bent Brothers, Inc., of Los Angeles, were the contractors for the construction of the dam and power house with M. H. Slocum as superintendent in charge of the work. R. V. Meikle was chief engineer, A. J. Wiley, consulting engineer, Ross White, resident engineer, Daniel McFarland, assistant resident engineer, C. E. Pearse, designing engineer and R. W. Shoemaker electrical engineer for the irrigation district.

Dr. Ryan Receives Edison Medal at A.I.E.E. Convention

PRESIDENT CHESNEY'S announcement of important policies, the presentation of the Edison medal to Dr. Harris J. Ryan, and a good program combined to make the Salt Lake convention of the Pacific Coast division of the American Institute of Electrical Engineers a success. Mr. Chesney stressed the vital importance of research and standardization in the future development of the electrical industry and urged the unified efforts of the Institute in that direction.

SUBJECTS relating to the transmission and control of electrical energy formed the largest group considered by the Pacific Coast convention of the American Institute of Electrical Engineers at Salt Lake City Sept. 6-10, 1926. Many other subjects of interest went to make up the well arranged program, notable among which were studies on lightning and on engineering education and on developments in electrical machinery. Well planned entertainment features provided adequately for members and guests during the time not occupied by business sessions.

This convention marked the inauguration of C. C. Chesney, vice-president and chief engineer of the General Electric Company, Pittsfield, Mass., as president of the Institute. In his address Mr. Chesney outlined and emphasized certain policies which should govern the activities of the Institute this year.

Governor G. H. Dern of Utah welcomed the delegates and guests. Governor Dern stated that the electrical industry was as yet in its infancy. He compared the spirit of electrical engineers with that of Western pioneers, the broad visions of each group playing important parts in advancement of the status of the human race. Governor Dern himself is an engineer and it was to this fact that President Chesney called attention in his response, stating that it denoted significant progress in American politics.

Industrial Advancement

In an address of unusually broad scope President Chesney prefaced his weightier remarks with an outline of the electrical history of the United States. Significant in this electrical development and particularly that of transmission and interconnection is the coming decentralization of industry. Those who have made the greatest contributions to the present state of advancement of the electrical industry are Wm. Stanley (the transformer), Nicola Tesla (the induction motor), Benjamin Lamme (rotary converter and other machines), Shallenberg (induction meter), and C. P. Steinmetz (mathematical solution of electrical problems). In the light of these important contributions Mr. Chesney urged that research be carried on unfalteringly, quoting at length from Dr. J. B. Whitehead of the research committee.

Parallel to and allied with research, in the opinion of President Chesney, is standardization. He outlined the history and development of standardization, covering the more recent activities both in this country and abroad and showed the enviable position earned by the Institute in this work. Some of his vital statement on this subject follow:

"The American Institute of Electrical Engineers for the past 25 years, through its standards committee, has taken the initiative in the formulation of all electrical standards of America, and its work is recognized as being authoritative throughout the entire world. Its procedure and its resulting standards during this period have been acceptable to the manufacturing and the consuming interests as well as to the general public. The industry has learned to value and to depend upon the A.I.E.E. standards in commercial transactions covering matters of interest to all sections of the electrical industry. It has made no effort to dictate to industry, but introduces standards on any particular line only when it is clear that all interested parties are in agreement that the step is wise and desirable. . . . In the Institute standards committee, or in its subcommittees, the manufacturer and purchaser and the general interests come together and develop the required standards in a way which has been generally satisfactory to all the interested sections of the industry. The electrical standards so issued have been identified with the name of the Institute, and its name should be continued in connection with them, and in the interest of simplicity and order it would appear that no other name is necessary. It should be remembered that the Institute as an organization has no interest other than one of public service, which duty the Institute has performed throughout the entire period of 25 years at its own expense. The Institute, therefore, in connection with the voluntary formulation of electrical standards has assumed obligations during the past quarter of a century which make it now impossible to discontinue the present practice or lessen its responsibilities until a more simple and direct method has been devised and demonstrated."

Two groups of papers were presented dealing in general with problems relating to transmission and control of electrical energy. One of these groups

dealt with the scientific and theoretical side and the other with the practical phases and operating experiences.

The space charge that surrounds a conductor in corona at 60 cycles was the subject discussed by Dr. Harris J. Ryan and J. S. Carroll, both of Stanford University. Work concluded so far proves that alternate positive and negative space charges do exist adjacent to a conductor in corona and that under conditions of very high voltages these may extend as far as 6 ft. from the conductor, forming a charged cylinder about the conductor. So far this work has been carried on with miniature models, but is planned to be continued on a larger scale. Questions brought the statement from Dr. Ryan that as yet it could not be ascertained whether or not the different velocities of positive and negative ions affected the space penetration of the space charges.

The circle diagram of a transmission network was discussed by F. E. Terman, also of Stanford University. The author's treatment of the subject is in elaboration of work previously done by others. It co-ordinates the graphical and mathematical methods of diagram construction and extends their applications. It also gives important geometrical checks which may be applied easily to computations, resulting in the production of a diagram almost error-proof and of great usefulness.

The calibration and interpretation of Lichtenberg figures as obtained from transmission disturbances were covered in a paper by K. B. McEachron of the General Electric Company, Pittsfield, Mass. This paper gives the results of a comprehensive study of the effect of transients upon the size and appearance of Lichtenberg figures. In general, three types of figures were found to exist and results showed that the value of voltage, the peak frequency, and the wave-front characteristics affected the figures. Dr. Joseph Slepian of the Westinghouse Electric & Manufacturing Company complimented the author's work and voiced the opinion that the basis of the figures was the ionization of gas immediately adjacent to the film. He based his opinion upon the fact that the figures differ with the gas and the pressure used. In gaseous ionization of this character the effect of leakage conductance would be appreciable at low frequencies, but not at high frequencies. Therefore it was his opinion that it was unsafe to attempt to use any constant relation between crest voltage and figure size.

Transmission Construction

L. R. Gamble presented a paper describing certain of the construction practices of The Washington Water Power Company as applied to that company's 110-kv. lines. This paper covered some of the standard structures used and one or two novel features such as the insulation of a long-span section of telephone line to permit it to be used for power purposes in case of the loss of a power conductor, and the use of heavy iron weights as "hold-downs" where unexpected upstrains were encountered in stringing conductors. He described also the use of a chemical dust for the preservation of poles, 7 lb. of this dust being placed in the pole hole as it is tamped in. Questions brought out the fact that this dust is poisonous and that the men handling it wear gloves and otherwise protect themselves, but that no injury to animals has occurred.

New construction standards and methods as adopted by the Southern California Edison Company on its Vincent line were presented by C. B. Carlson and H. Michener of that company. Some of the outstanding features of this line are the use of but 3.94 towers per mile over its 223.5-mile length; the turning of angles up to over 11 deg. on standard suspension construction; the use of 1,033,500-circ-mil aluminum cable reinforced with 134,000-circ.mil steel core; and the use of standard 64-ft. suspension and 56-ft. dead-end towers with 7, 14 and 21-ft. standard extensions as needed.

High-tension construction in the East was touched upon by E. S. Healy and A. J. Wright of the Electric Bond Share Company. In this paper were presented numerous experimental data regarding unbalanced conductor tensions and loadings and their effects in a long-span transmission line. Computations were at least partially verified by actual test upon a half-mile section of experimental line. The results were used in the design of the 220-kv. Wallenpaupack-Sigfried line of the Pennsylvania Power & Light Company. Unusually heavy loading conditions were considered and the results were interesting.

New Switch Design

One of the notable papers of the convention was that of R. W. Sorensen and H. E. Mendenhall of California Institute of Technology. A series of experiments were described that give great promise of the development of a commercially successful vacuum-type switch of extremely small dimensions that would interrupt large currents at high voltages. The maximum operating strain used in the experiments on the switch, which can be held in the palm of one hand, was 926 amp. at 41 kv. Such a load was interrupted numerous times without any pitting of contacts or other signs of stress in the switch. P. M. Downing of the Pacific Gas and Electric Company observed that this potential development was very welcome due to the fact that oil circuit breakers are extremely expensive and not entirely satisfactory. Dr. Slepian of the research division of the Westinghouse Electric & Manufacturing Company stated that the results of Prof. Sorensen's experiments called for a revision of the theory of the electric arc. Until recently the thermionic emmission theory has held, but has given way to the present gaseous ionization theory. Experiments seem to show that a gas is not necessary to permit a cold-cathode emmission, and also show the necessity of further experiments and research to establish the true facts. G. E. Prince of the General Electric Company suggested that a theory applied to the performance of mercury-arc rectifiers might obtain for vacuum switches. This suggested that collision-ionization occurred and that positive ions flowed to the cathode establishing a space charge giving a high potential gradient near

the cathode and resulting in the pulling of ions from the metal. Further discussion brought out the fact that even the best so-called high vacuums did not eliminate all of the gas, some remaining in the switch acting as an emissivity agent. Experiments seem to show that electrons are not pulled readily from metal under a metal temperature of at least 1,000 deg. F.

The temperature of a contact and related current-interruption problems were discussed in a paper by Dr. Joseph Slepian. The author derived a formula for computing the temperature of the last of a pair of separating contacts. The relation of this value to arcing at a switch-tip, to brush drop and to commutation was covered in the paper and numerous experiments on the interruption of a current by a vacuum switch were described.

Engineering Education

In presenting his paper on this subject H. H. Henline of Stanford University gave some valuable suggestions in the arranging of engineering curricula and aroused perhaps the most lengthy and complete discussion of any of the papers presented. The object sought by Prof. Henline in his 4-year engineering course, leading to an A.B. in engineering, plus a 2-year additional course, leading to the degree of Engineer in the subject chosen, was better to prepare the average engineering student for the assumption of life problems than can be done with a 4-year specialized course. His idea is a broader and more cultural foundation for the engineering student and at the same time retaining the opportunity for advanced specialized study for those qualified. The discussion in general was in support of the proposals, differing mainly in minor points and in methods of application.

Lightning

A study of lightning rods and cages, with special reference to the protection of oil tanks, was given by F. W. Peek, Jr., of the General Electric Company. The paper is a further report of the work that the author has been carrying on for several years. Special attention is given to the probability of objects being struck, the area protected by rods or overhead wires, the effects of nets and cages in reducing induced voltages, and in particular a series of experiments pertaining to oil-tank protection. The author concludes that a vertical rod will protect an area having a radius of about four rod-lengths and that a properly arranged series of rods will fully protect the area between them from direct hits. Attention also is called to the fact that lightning discharges as far as a mile away will cause extremely high induced voltages resulting in damaging sparks. Some discussion between Prof. Sorensen and Mr. Peek brought out the fact that the differing results obtained in the California Institute of Technology laboratory were due to the use of high-frequency, oscillatory discharges of a much greater time element than the truly non-oscillatory complete discharge used by Mr. Peek.

Mr. Peek concludes that the only full protection to an oil tank is the use of an all-metal tank. However, varying grades of protection may be obtained by rods in combination with bonded-metal roof.

Mining Practice

Safety in electrical mining installations was the subject of a very candid paper by Daniel Harrington, consulting engineer of Salt Lake and chief safety engineer of the U. S. Bureau of Mines. The author stressed the many advantages of mechanizing the mines, and of the use of electricity in particular. However, he pointed out forcibly that manufacturers should produce only acceptably safe electrical mine equipment and that installations should be so supervised as to insure proper application and rigid maintenance to reduce hazards. Electrical practice in the lead-silver mines of Utah was the subject of a paper presented by Leonard Wilson, consulting engineer of Salt Lake.

The application of electric drive to power shovels is one of great interest. The development and operation of variable-voltage a.c. equipment for this class of service was covered in a paper by R. W. McNeill of the Westinghouse Electric & Manufacturing Company.

Stability and Electrical Machines

The steady-state stability characteristics of small alternators were treated in a paper by O. E. Shirley of the General Electric Company. Tests made give the basis from which the value of short-circuit ratio may be derived, this ratio being the best guide for determining machine stability. A series of curves were developed from the data given the stable short-circuit ratios for alternators in general service. Load characteristics were influential in the determination of steady-state stability limits according to the author. An operating margin of about 15 per cent in voltage, or about 5 per cent in kva., was recommended.

Calculation of the synchronizing power in synchronous machines was covered in the paper by H. V. Putman of the Westinghouse Electric & Manufacturing Company. The author derived certain formulae and proposed methods of solution by which the synchronizing power of machines might be calculated fairly accurately under almost any conditions likely to be met with in practice. Greater accuracy is claimed for the proposed solution than that possible with present methods. Active discussion of this paper brought many dissenting views from C. A. Nickle regarding the author's methods and procedure. Mr. Putman rebutted by saying that any workable solution of this problem was subject to certain assumptions and minor errors, an exact solution being practically impossible. He pointed out that the best check on methods of solution was the commercial success of machines so designed and that machines designed by his formulae were giving entirely satisfactory operation.

Generator Fire Protection

The latest in fire-protection schemes for water-wheel generators was described by J. A. Johnson of the Niagara Falls Power Company and E. J. Burnham of the General Electric Company. The

system outlined is designed to limit both fire and water damage to the immediate section where the fire occurs. This is accomplished by air baffles which so control the flow of ventilating air that the whirling action common in the end windings is overcome, and by the use of fusible sprinkler heads which permit the application of water nowhere but at the scene of the fire. The sprinkler heads are under air pressure through a restricting valve so that the operation of a head causes a reduction of air pressure in the line and causes the sounding of an alarm through the operation of a contact-making pressure gage. The operator then can investigate and turn water into the sprinkler line only if the seriousness of the fire justifies that method of extinction.

Communication

Transmission features of transcontinental telephony and attendant design considerations were described by H. H. Nance and O. B. Jacobs of the American Telephone & Telegraph Company. The paper covered the communication channels obtained from transcontinental facilities and included carrier-current systems, repeaters and signalling systems. One of the interesting features was an explanation of the so-called network broadcasting service such as that used to broadcast the inaugeration of President Coolidge.

A practical application of carrier-current telephony to submarine cables was described by W. W. Hitchcock of the Southern California Telephone & Telegraph Company. The installation described is in operation between the mainland and Santa Catalina Island, off the southern California Coast. This system is the only one in operation on deep-sea cables, the shortest (26 miles) such system in commercial operation, and provides six channels of conversation.

Telephone insulation difficulties such as encountered in the vicinity of the Great Salt Lake were covered by B. F. Howard of the Mountain States Telephone & Telegraph Company. The description gives results of observations and operating practice on different lines in that area. Salt, ice and fog combine against communication lines there and the author gave an outline of the methods used to combat these conditions.

Entertainment

Numerous well planned features provided an excellent class of entertainment for delegates and guests. An organ recital in the celebrated Mormon taberanacle, a trip for the women about the city and nearby canyons, and an evening at the famous Saltair resort on the Great Salt Lake were on the first day's program. Tuesday the women were guests at the country club for luncheon and golf. In the evening an informal reception, musical program and dancing brought a large crowd to the ballroom of the Hotel Utah. On Wednesday an excursion took the women to Pinecrest Inn at the head of Emigration Canyon for luncheon. President Chesney addressed the first meeting of the season of the Salt Lake Chamber of Commerce at which a large number of Institute delegates were present. Honors in the Tuesday afternoon golf tournament were carried off by P. M. Downing, regional vice-president of the Institute and vice-president of the Pacific Gas and Electric Company.

Ryan Receives Edison Medal

The outstanding feature of the convention was the presentation of the Edison Medal to Dr. H. J. Ryan of Stanford University. Dr. Ryan is one of the best-loved members of the Institute if not of the entire electrical profession and the occasion of his honor in the receipt of the Edison Medal was a most impressive one. President Grant of the Mormon Church, U. S. Senator Reed Smoot of Utah,

DR. HARRIS J. RYAN

Mayor Neslen of Salt Lake and National Secretary Hutchinson of the Institute were among the notables at the head table with Dr. Ryan.

In following the official method of procedure for such occasions President Chesney called upon Secretary Hutchinson to outline the significance of the Edison Medal, and upon P. M. Downing to give a biography of Dr. Ryan. Subsequent to this President Chesney presented the medal and certificate to Dr. Ryan who responded with a heartfelt message.

Inspection Trips

During the golf tournament those not participating were taken to Terminal substation of the Utah Power & Light Company where they witnessed high-tension substation construction as practiced by that company. Thursday afternoon a large delegation took the trip to the copper city of Bingham where they were the special guests of the Utah Copper Company. A full insight into mining operations and the application of electricity to the important phases thereof was obtained through this trip.

The two inspection trips to the generating plants of the Utah Power & Light Company proved interesting indeed. The Friday trip to the Cutler plant drew a crowd that was unable to take the time necessary to see the whole system. Those who could were taken on a 2-day trip over the entire Bear Lake-Bear River system of the power company. This trip was especially instructive due to the unusual conditions met with in the erection and operation of this series of plants.

Not only the entertainment feature, but the entire convention was immensely enjoyed by all in attendance. Credit is due to convention chairman C. R. Higson of the Utah Power & Light Company and to his committee for the program that they put on.

Rocky Mountain Convention Features Sales and Public Relations Problems

INFILTRATED through each of the four business sessions of the Glenwood convention, and touched upon from one angle or another by a majority of the individual speakers, were the equally important subjects of sales and public relations. This meeting was the twenty-third annual convention of the Colorado Public Service Association and the seventh annual convention of the Rocky Mountain Division, N.E.L.A., held jointly at Glenwood Springs, Colo., Sept. 13-16, inclusive. One general session was held each morning, thus enabling all delegates to participate in and benefit from the activities of all four of the sections. Subjects taken up and addresses made at each of the sessions were so diversified that the sessions were of common interest to all.

Discussions pertaining to sales and commercial efforts outlined rather in detail and from many different angles the difficulties, necessities, opportupnities and problems attendant upon the revision of sales programs and policies to meet present and coming conditions in the industry. It was interesting to note the wide interest in this subject and its intimate relation to other phases of the industry's endeavors.

Public relations, for want of a better term, its problems and opportunities for successful development to a sound status also appealed to many of the speakers. Here again the intimate relationship necessary between the public and every phase of utility activity was brought out from various viewpoints. It seemed to be the consensus of opinion that every person in every division of utility work must be selected and trained to discharge a proportionate responsibility in the development of the selling and the public relations problems of the industry.

Activities of the associations in the Rocky Mountain region during the year 1925-26 have resulted in a closer tie between the various utilities serving that region, and in a closer understanding between the utilities and the general public, according to E. F. Stone, president, Colorado Public Service Association and assistant general manager, Southern Colorado Power Company. Mr. Stone's address served as the opening gun of the convention. In his remarks were set forth the various phases of the year's work and certain proposed activities for the coming year.

Of particular importance was his recommendation that the meetings of the state associations of Colorado, Wyoming and New Mexico be so rearranged as to permit a greater and fully cooperative joint annual convention. Mr. Stone recommended that each state association hold one purely local convention each year to transact business of a local character only. He further recommended that the Rocky Mountain Division, N.E.L.A., limit its convention activities to the one annual joint convention at Glenwood Springs, Colo., and that such annual convention be fully and officially participated in by each of the state associations. This scheme Mr. Stone believes will result in greater and far more beneficial co-operation between the state associations, greater and more representativ attendance at the joint convention, and the accomplishment of a greater amount and higher quality of work in the three states involved, jointly and severally.

The N.E.L.A. has been instrumental in bringing about the most perfectly co-ordinated industry in the world, according to R. F. Pack, president of the N.E.L.A. and vice-president and general manager, Northern States Power Company, Minneapolis, Minn. Standardization of equipment and apparatus and the promotion of a uniformity of thought and purpose within the electrical industry are some of the particular accomplishments touched upon by Mr. Pack. He compared the electrical industry in the United States with that in England and stated that the U. S. produced more kw-hr. in 1925 that did all the rest of the world together. He also stressed the importance of the national convention in the scheme of a co-ordinated industry.

In discussing the activities of the Public Relations Section C. A. Semrad, chairman of that section and vice-president and general commercial manager, Public Service Company of Colorado, stressed the obvious fact that only with the good will of the general public can the electrical industry advance successfully. He strongly intimated that more serious work and less talk was needed in this important work. In an attempt to analyze the public relations problem Mr. Semrad pointed out that the public has consistently received greater service from the electric utilities than from any other business enterprise. He believes the source of the trouble to be elsewhere; to be in the fact that development in the production and application of electricity and the growth of power systems and organizations have been so great and so rapid that they have grown completely out of common public understanding. The industry is growing far more rapidly than are public knowledge and conception of its aims.

The electrical industry sells an intangible commodity and gives with it an extensive service while the average business enterprise sells a tangible commodity with only a negligible service. This fact makes essential a definite effort in confidence building, in the belief of W. A. Jones, chairman of the Public Relations National Section and chairman of the executive committee, Henry L. Doherty and Company. Mr. Jones stated that the delayed realization of this fact has resulted in engendering an involved mistrust in the mind of the average person

outside of the industry. The lack of truthful information regarding the various phases of the industry has been taken as prima facie evidence that the utilities were conducting their business in a purely selfish way.

The extensive possibilities of properly handled advertising in getting business and in building public good will were elaborated upon in a paper prepared by Herbert Metz, advertising manager of the Graybar Electric Company and presented by A. C. Cornell of that organization's Denver office. In his paper Mr. Metz outlined as an example the many difficulties attendant upon the change in the name of his company. He pointed out the many angles of the problem including the selection of a name with a definite significance, the care necessary in preparing a monogram and the methods of advertising to establish both. As a feature in furtherance of utility public relations Mr. Metz urged the use of space in programs and leaflets published by churches, societies, etc., the full use of local papers and other publications, and generous contributions to all worthy public enterprises such as parks, monuments, playgrounds, etc.

The selling problem of the industry was discussed and analyzed in a paper prepared by G. C. Tenney, managing editor of the Journal of Electricity and presented by R. Ross Henninger, associate editor of that publication.

A symposium of ideas on effective advertising and publicity was contributed to by E. A. Bemis, state field secretary of the Colorado Editorial Association; L. W. W. Morrow of Electrical World; J. F. Greenawalt, vice-president of the Colorado Public Service Association and publicity manager of the Mountain States Telephone and Telegraph Company; and G. Ross Henninger of the Journal of Electricity. The general consensus of opinion seemed to be that effective advertising must follow a definite program, be instructive, be terse, be illustrative and illustrated, and be directed definitely toward a particular objective.

Arthur Praeger, president of the Rocky Mountain Division, N.E.L.A., and general manager of the Albuquerque, N. M., Gas & Electric Company, opened the second day's session with an address covering some of the managerial problems. Mr. Praeger stressed the fact that the successful utility manager must be an untiring student of utility development and advancement. He spoke of the important part played by the standard trade papers which he characterized as the torch bearers of the industry, warning of dangers and leading in development. The first and most important step toward better public relations lies in a "house cleaning" wherein every employee is so selected, treated and trained that he becomes a booster and a disseminator of facts regarding the industry. High ethical standards are essential in Mr. Praeger's belief and absolute honesty the most important quality of utility business.

Some interesting conceptions of the electric utili-

A. A. Weller (left), Public Service Company of Colorado, Denver, was convention chairman as well as secretary of the Rocky Mountain Division, N.E.L.A., and secretary-treasurer of the Colorado Public Service Association. Center: Two presidents, one retiring, one incoming. E. N. Stone, Southern Colorado Power Company, retiring president Colorado Public Service Association, and J. F. Greenawalt, Mountain States Telephone & Telegraph Company, newly elected president. Right: James Potts, manager, Rawlins (Wyo). Light & Fuel Company.

ties from an outsider's viewpoint were discussed by R. M. Crane, president of the Denver Chamber of Commerce. In his opinion the one real problem of the utilities is to overcome a lack of public interest in utility development. This must be done by a terse presentation of forceful facts.

Development of the technique of the industry was touched upon by W. D. Johnston, chairman of the division Engineering Section. A paper by C. F. Hirshfeld, chairman of the Engineering National Section, was presented by Mr. Johnston. This paper dealt with certain economic features of power system interconnection. The obligation of the electrical industry to educate the remaining rural population to the full use of electrical energy was stressed by J .A. Clay, chairman of the rural electric service committee. The advantages accruing from the careful planning and execution of adequate wiring jobs were outlined by Geo. Bakewell, Jr., executive manager of the Electrical League of Colorado. Mr. Bakewell also outlined the activities of the League toward securing the installation of greater electrical service facilities in all new buildings erected in the territory served by that organization.

The general public is essentially fair-minded, according to E. W. Hodges, manager of public relations for Henry L. Doherty and Company of New York, who was the outstanding orator of the convention. In his belief if the public be made acquainted with and interested in the many important details and problems of public utility work that public will respond with a genuine interest in the progress of the utility, realize its importance to the community, and cease to be subject to political leadership. Some of the many other highlights of Mr. Hodges' address were as follows: the public resents being "educated," but openly accepts information properly presented; "service" and "public relations" both are worn-out terms, representing too much talk and not enough genuine work and constructive effort; the purchase of a so-called "public relations man" is but a minute step in the right direction and is justified only in an organization so large that the general manager himself cannot attend to the details of such work; successful public relations improvement rests ultimately upon such an internal condition of the utility that every person on the payroll is a whole-souled emmissary for the "cause."

The situation in which the street railways now find themselves and its contrast with that of practically every other utility was the subject of an interesting and extended discussion by S. B. Irelan, general manager of the St. Joseph, Mo., Railway, Light, Heat & Power Company. Mr. Irelan is a decided optimist on the question and presented facts and figures of particular value to traction interests.

Due to his severance of connection with the N.E.L.A., M. H. Aylesworth, formerly managing director of the association, was not present to take his scheduled place on the program. G. A. Davis, manager of public relations for the Oklahoma Gas & Electric Company spoke in his stead on the subject of a successful public relations organization. Mr. Davis characterized "public relations" as the outward expression of an inward grace, and that its ssuccess depends upon a full realization of duty to the public.

Activities of the local accounting section were outlined by W. J. Benning, chairman of the section and general auditor of the Southern Colorado Power Company. Speaking further in behalf of the importance of proper accounting, W. R. Emerson, vice-chairman of the Accounting National Section and treasurer of the Oklahoma Gas & Electric Company, stressed in particular the value of accounting records in rate cases. He stated that the quality of the man-power in the industry must be brought up to a parity with the quality of the product of the industry.

Insurance is one thing from which few utilities get the fullest possible value, due to their own oversight, according to J. E. Loiseau, chairman of the insurance committee and secretary of the Public Service Company of Colorado. Mr. Loiseau stressed the importance of constant study of the insurance problem to assure the greatest protection and return, giving many specific instances.

To assist in the establishment of a friendlier feeling between the utilities and their customers, Mr. Loiseau suggested the adoption of a form card or letter which would be issued to a customer leaving a city. This letter or card to be issued only to those customers having regularly paid their bills and otherwise established satisfactory credit relations with the issuing utility during a minimum 6-month period. The letter or card to be an introduction and recommendation of the customer to the receiving utility and to be recognized by and among all of the utilities in the Rocky Mountain Division of the N.E.L.A. The receiving utility may further cement the good will of the customer bearing such an introduction by waiving the service deposit or in any other way desirable. After discussion the plan was adopted for a year's try-out.

The aggressive enthusiasm and peculiar qualifications of the women in the industry have proved them to be the logical medium of approach to the housewife and the most important channel through which to effect the full electrification of the home. This keynote of women's activities was sounded by Isabell Davie, secretary of the women's committee of the Public Relations National Section. Miss Davie outlined the work of the women's committee explaining that it functions in a manner similar to any other N.E.L.A. section. Miss Davie complimented the women of the Rocky Mountain Division and urged them to further effort in view of the woman's inherent understanding of and contact with affairs and interests of the home.

An outline of the history of the development of modern communication was given by J. F. Greenawalt, vice-president of the Colorado Public Service Association and publicity manager of the Mountain States Telephone and Telegraph Company.

In the absence of W.H. Onken, Jr., editor of Eleictrical World, L. W. W. Morrow, managing editor of that publication, presented some valuable

information and suggestions incident to making the business of the electric utility more prosperous. Mr. Morrow gave reflections obtained from such work being carried on by certain of the electrical interests throughout the United States.

Reports were rendered by J. A. Clay, chairman of the rural electric service committee and general manager of the Western Colorado Power Company; and G. B. Buck, chairman of the Commercial Section and manager of the electric sales department of the Public Service Company of Colorado. Mr. Buck stressed several points among which were the following: the necessity of a radical change in sales program of most utilities; the failure of $125-per-month men to handle the $12,000,000 annual sales problem of the utilities; the necessity of carrying electrical merchandise to the home in selling efforts; that merchandising is secondary to an increased production and sale of kw-hr.

Officers elected at the convention for the Rocky Mountain Division, N.E.L.A., and to take office July 1, 1927, are as follows: president, W. C. Sterne, president and general manager, Municipal Properties Investment Company, Denver; vice-president, C. N. Stannard, vice-president and general manager, Public Service Company of Colorado, Denver; vice-president, E. P. Bacon, Midwest Public Service Company, Casper, Wyo.; vice-president, J. A. Clay, general manager, Western Colorado Power Company, Durango, Colo.; members-at-large, A. C. Cornell, manager, Graybar Electric Company, Denver; James Potts, manager, Rawlins Light & Fuel Company, Rawlins, Wyo.; K. W. Kissick, manager, Deming Ice & Electric Company, Deming, N. M.; E. F. Stone, assistant general manager, Southern Colorado Power Company, Pueblo, Colo. Both Mr. Stannard and Mr. Bacon, respectively, were in line for the presidency of this organization, but declined the nomination under the plea of press of work.

Officers elected for the ensuing year, 1926-27, for the Colorado Public Service Association are as follows: president, J. F. Greenawalt, publicity manager, Mountain States Telephone and Telegraph Company; vice-president, H. S. Robertson, general manager, Denver Tramway Company; vice-president, V. L. Board, general superintendent, Public Service Company of Colorado; executive committee, W. P. Southard, Trinidad (Colo.) Electric Transmission, Railway and Gas Company; Fred Norcross, Home Gas and Electric Company, Greeley, Colo., and J. A. Clay, Western Colorado Power Company, Durango, Colo.

The guiding genii of the entertainment program were Mr. and Mrs. J. J. Cooper of Denver. The elaborate program included a golf tournament, horseshoes pitching contests, water carnivals in the outdoor pool supplied from natural hot springs, motor trips and bridge tournaments for the ladies, and outdoor feast and barn dance at a nearby retreat, dancing in the evenings and last and a fitting finale, the annual banquet presided over by J. C. Burger as toastmaster.

W. A. Jones (left), treasurer, N.E.L.A., and chairman of the Public Relations National Section. He is chairman, executive committee, H. L. Doherty & Company. Mr. and Mrs. J. J. Cooper (at center), the heart of the entertainment program. Mr. Coope is connected with the Mountain Electric Company, Denver. J. A. Clay (right), Western Colorado Power Company, Durango, Colo., and chairman of the rural electric service committee.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Tower per Day Going Up on Vincent 220-kv. Line

Rapid Progress in Erection of Edison Company's New Line Made Possible by Novel Methods Used

By J. B. WHEELER, Superintendent of Construction, Southern California Edison Company, Los Angeles

Construction work on the new 220-kv. transmission line between the hydro-electric plants of the Southern California Edison Company situated on the Big Creek and San Joaquin Rivers and southern and central California is proceeding rapidly and according to schedule. Plans now call for completion of the southern half of the line, that is, the portion south of the Magunden switching station, near Bakersfield, Calif., to Los Angeles, early in 1927. The northern half of the line, extending from the Magunden switching station to the plants, is to be completed early in the spring of 1928, in time to take on the additional load occasioned by the completion of the Big Creek No. 2-A, fifth power house of the San Joaquin-Big Creek project.

To facilitate the matter of procuring rights-of-way over the 225-mile stretch the company ran this new line through mountainous territory just as far as possible. This necessitates the construction of 75 miles of road to make this right-of-way accessible first to the construction department and later to the operating department. The first stretch of road to be built was 38 miles long through a territory which hitherto has been accessible to none but the hardiest type of mountain climber. This piece of road extends from near the Eagle Rock substation at the northwestern city limits of Pasadena to Vincent, a station on the Southern Pacific on the southern edge of the Mojave desert in Antelope Valley. Work on this road began Sept. 1, 1925, and was finished early in May, 1926. This 38-mile road was necessary for the construction and later maintenance of the initial 19-mile stretch of the new 220-kv. line. The width of this road is 9 ft. throughout with a maximum grade of 10 per cent. Approximately 300,000 cu.yd. of rock and soil were removed in the building of this road, the entire cost of which was about $450,000, or approximately $12,000 to the mile.

It was necessary first to break a trail through the virgin wilderness. This trail later was widened out making it possible to get through with small tractors, later followed by the road-building machinery used to complete the work. Approximately one pound of powder was used per foot of road built.

There will be 826 standard towers and 21 anchor towers throughout the entire length of 223½ miles of line. These towers have a height of 55 ft. to the conductor with extensions in 7-ft. multiples allowing the towers to be built up to 90 ft. A standard tower weighs a little more than 5 tons and is made up of 268 members fabricated with 867 bolts. An anchor tower weighs approximately 10 tons and has 291 members with 1,260 bolts. These towers are shipped to central receiving stations at various convenient points along the right-of-way and are distributed thence to the proper location unit by unit.

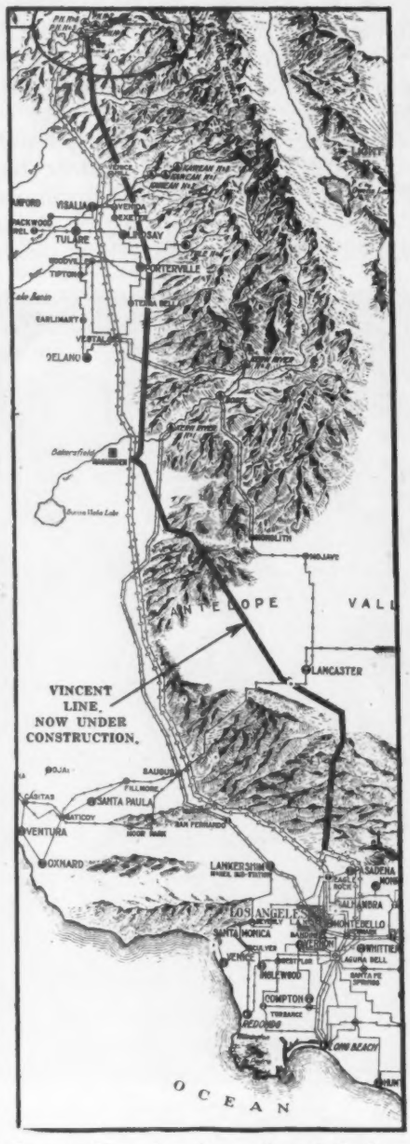


Fig. 1. Map of major portion of Southern California Edison system showing relation of new 220-kv. Big Creek transmission line.

When it is remembered that, should a single member of a tower be missing when the erection begins, an entire crew of men is held up until the missing member can be obtained it may be appreciated how important it is that the shipping clerks in the various supply centers shall know their business. The standard time for erection has been set at 8 hours, although there have been a few instances when a tower has been built in 6½ hours. The towers will average approximately 4.2 towers per mile throughout the line.

Conductor cable is 1,033,500 circ.-mil in cross-section and made up of 54 strands of aluminum and 7 strands of steel. It weighs 1⅓ lb. per ft. A new splice has been developed with a steel compression sleeve on a steel core and aluminum compression sleeve over all. These compression sleeves distribute the stresses throughout the composite splice. The aluminum strands are removed from the 7 strands of steel at the two ends of the cable which are to be spliced and these 7 strands of steel then are inserted into opposite ends of a steel sleeve. Over this entire steel sleeve and extending back over the aluminum strands of the cable proper an aluminum sleeve is placed. Then under a hydraulic press with a pressure of 80 tons these sleeves are compressed until the splice has become practically a solid piece of metal with tensile strength greater than that of the cable itself.

In the actual stringing of the cable many refinements have been instituted. Roller-bearing blocks with a specially constructed come-along have made it possible to hook a 10-ton tractor to the end of 5 miles of cable and pull this whole length up to 12,000-lb. tension in one operation. Under the old type of construction one mile of cable at a time was considered to be the limit, it being the custom to pull approximately a mile of line up to tension and then dead-end it. It has been discovered that under the new system it is possible to pull up the 5 miles of cable and merely clamp the line to all the insulator strings without dead-ending. When the cable is unhooked from the drawbar of the tractor it has been found that the entire pull of the 5-mile line section is absorbed and counter-balanced by the dead-weight of the five last spans of line. In other words the strings of insulators on the last five towers strung will be pulled slightly off their vertical line, but the insulators on the sixth tower back from the end of the line hang down perfectly straight and are not affected by the fact that the line has not been dead-ended.

There are 13 units on the single suspension strings used on the ordinary line towers. Where there is a particularly heavy strain on the tower, such as on mountain peaks preceding long spans, the strings are doubled up making two strings in parallel holding the load. At the dead-ends 15 units are used on each of two parallel strings. These insulators have a strength test of 18,000 lb. All hardware is drop-forged or steel plate, no castings being used. On the straight-line towers the cable is suspended through the insulator; at the dead-ends a compression joint similar to that used in splicing has been adopted and is proving highly satisfactory. The length over all of a standard string of insulators is 9 ft.

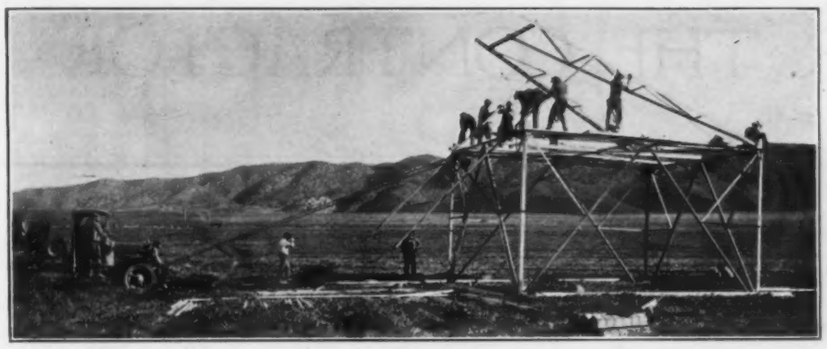


Fig. 2. Tower in course of erection. Foundation sections of three others may be discerned in the distance.

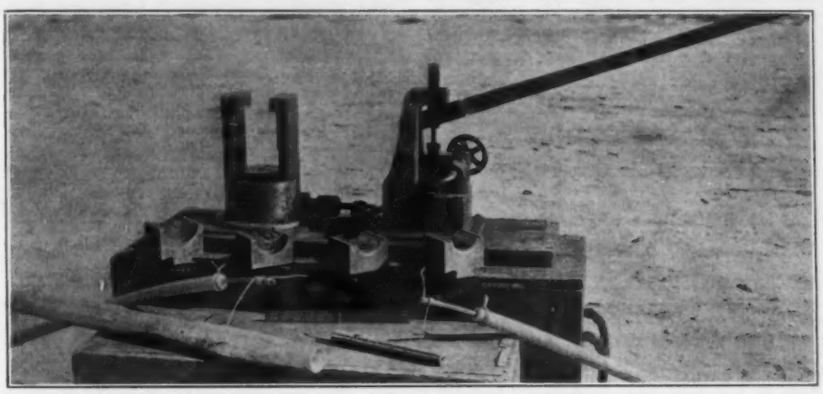


Fig. 3. All ready to make a splice in the steel-core aluminum cable, showing aluminum stripped from steel core, steel sleeve, aluminum sleeve, 80-ton hand-operated press and dies. Relative sizes may be determined from the 1-ft. rule on the box in the foreground.

A two-circuit telephone line strung on small full-length pressure-creosoted Texas pine poles follows the right-of-way of the transmission line.

Inasmuch as plans for the job indicated that it would last at least 30 months it was thought advisable that all motor and tractor equipment should be new. Hence 30 2½-ton trucks, 8 1-ton trucks, 17 light cars with a light truck body attached, 5 2-ton busses for hauling the men back and forth from camp to the work, 10 tractors ranging from 5 to 10-ton and 13 2½-ton trailers were purchased. This does not include 25 miscellaneous pieces of equipment such as compressors, graders, Fresno scrapers, plows, etc.

The entire line will require approximately 6,000 tons of steel, 25,000 tons of aluminum, 350 tons of insulators, 70 tons of hardware, and 500 tons of miscellaneous material such as packing material, reels and the like.

Every reasonable means possible is taken by the company to maintain a happy working force. Young men, preferably from the farming districts adjacent to the right-of-way, are being used wherever it is possible to get them. These young fellows have proved to be exceedingly efficient workmen and eliminate the danger which might come from having the old-time, hard-to-handle, drifting, migratory labor which otherwise might be attracted to the job. Every camp comfort that it is possible to supply is furnished to the men. Excellent quarters carefully kept, numerous shower baths and other sanitary equipment are furnished at each of the camps.

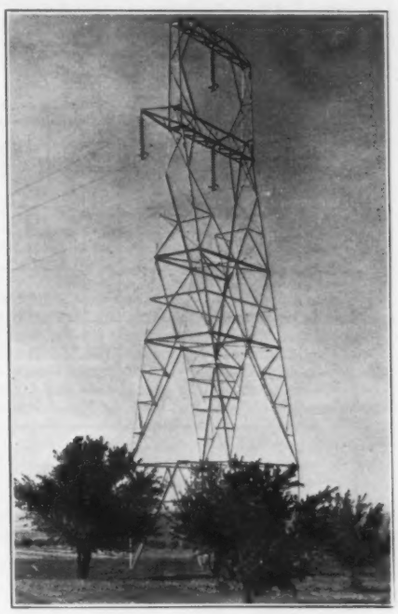


Fig 4. Transposition tower.

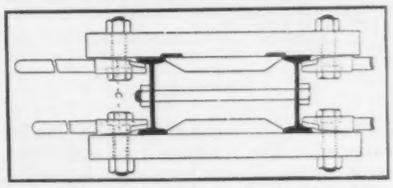
To preserve and keep in the best of condition the 30,000 lb. of meat that is consumed monthly, large electric refrigerator units have been installed in each camp. In addition to the 30,000 lb. of meat 20,000 lb. of other food stuff and 5,000 lb. of miscellaneous supplies are consumed each month. Preparation of this food is in the hands of capable stewards who have under them the best camp cooks obtainable.

A force of approximately 500 men will be maintained throughout the period of the job. Work is organized on the basis of 8 hr. per day.

The estimated cost of the completed job with appurtenant substation and switching equipment has been placed at $11,000,000.

Unique Design of Steel-Concrete Pole Used in Australia

Another idea in pole design and fabrication now comes to the front. J. C. Stobie of the Adelaide Electric Supply Company (Australia) has invented the pole, a cross-section of which is shown in the accompanying sketch. As may be noted, the essential features of the pole are the two light I-beams forming the outside stress members and the spacer bolts whcih regulate the separation of these two members. The stay bolts are placed at carefully determined intervals and not only act as spacers but take a portion of the shear. The space between the outside members is filled with concrete. This forms a web that provides the pole with the necessary rigidity and a desirable resistance to the torsion that would be present due to unequal loading.



Cross-section of concrete pole showing forms in place.

Ordinary labor and commonplace equipment are all that is required for the construction of these poles. An additional feature that is attractive is the fact that the poles can be fabricated in the field adjacent to where they are to be erected, thus saving the transportation of unwieldy finished poles, for all poles are unwieldy and many times difficult to transport. The I-beams are placed on a greased steel slide, provided with wooden forms which serve also as spacers between the flanges, and then held rigidly by means of clamps. This is indicated in the accompanying illustration. For the upper few feet where the taper throws the side members so close together chambered forms are not used, the concrete being allowed to fill out flush with the outer edges of the flanges.

IDEAS FOR THE CONTRACTOR

Electrical Estimating for the Contractor—XV

Use of Screw Conveyors, Flight Conveyors, Belt Conveyors Considered and Estimating Methods Outlined

By J. R. WILSON*, Quality Electric Works, Los Angeles.

In addition to the chain type of conveyor considered in the previous article of this series several other types of conveyors designed to meet certain conditions of operation or materials are in general use. Among these may be mentioned flight conveyors, screw conveyors and belt conveyors. As the screw conveyor and the belt conveyor are probably used more than any other types, the present article will give some information pertaining to them.

Screw Conveyors

Screw conveyors are divided into several classes and types dependent upon the use to which the conveyor is to be put. The basic design is typical, but

Horse-Power Required by Caldwell Helicoid Screw Conveyors

The following formula will be found useful in ascertaining the horse-power required for Caldwell Helicoid conveyor.

In all cases in using this formula, figure as the capacity the maximum capacity which the size of conveyor to be used will handle at the speed at which you expect to run the conveyor. See table No. 1 The formula is conservative, and the running horse-power of the conveyors will probably not be as high as the result obtained from the use of the formula.

$$H.P. = \frac{KcCwL}{2,000,000}$$

Where K = 1.2 for grain.
2.5 for fine coal, cement, etc.
4.0 for sand, ashes, etc.
Where C = capacity in cubic feet per hour.
Where W = weight of material per cubic foot.
Where L = length of conveyor in feet.

The power required to drive screw conveyors depends upon the specific nature and condition of the material to be handled, and for this reason no formula is entirely satisfactory in all cases.

Formula 1.

the size and contour of the blades vary with the conditions of operation. Most screw conveyors are made of steel, galvanized steel, or cast iron, but they are also built of brass, copper, monel metal or aluminum to meet certain conditions prevalent in the fruit packing and chemical industries.

One of the best known types of screw conveyors in general use is the Caldwell Helicoid conveyor. This type is used for the conveying of grain, coal, ashes, cement, sand, liquids, molasses, hot tar, asphalt, sugar, etc. The blades used are specially designed to meet the conditions specified by the users.

Some blades will stir the material and will also cool it, while transporting it between two points. Other types of blades are designed for mixing two or more materials together. These are variously called stirring paddles, mixing paddles, cooling paddles, ribbon conveyors, etc. Table 1 gives capacities of these conveyors and Formula 1 explains how to estimate the horse-power required.

Belt Conveyors

The belt conveyor is one of the best known and most useful of conveying devices. It has been generally adopted as standard for the mechanical conveyance of bulk and package materials, and has an extremely wide range of adaptability. There are several outstanding points which have recommended the belt conveyor for general use, among which are:

1. Large capacity with low power consumption.
2. Low initial cost, in ratio to capacity.
3. Small operating and maintenance cost.
4. Simplicity of construction.
5. Unrivaled dependability.

It is entirely practicable with belt conveyors to handle any materials which can be loaded upon the conveyor providing the materials do not adhere to the belt. Among the materials which are being successfully handled in numerous plants may be mentioned:

Ashes, brick, bags, cement, chemicals, clay, clinker, coal, coke, crushed stone, lime, flour, grain, fertilizer, plaster, sand, gravel, packages, soil, ores, starch, sugar beets, etc.

Belt conveyors are now being used up to five feet in width, and the tensile strength of the belt is the only limiting factor of possible length. Conveyors 1,000 ft. in length between centers are in successful operation. Satisfactory operation indicates an incline of from 18 to 22 deg. maximum as best practice, dependent upon the size, shape and class of materials to be handled.

It is practicable to run these conveyors at relatively high speed, thereby giving large capacity. The relatively light weight of the device allows the use of long span supports, and the use of comparatively light weight metal or timber trusses.

The three elements of paramount importance in a belt conveyor are:

1. The supporting idlers.
2. The belt.
3. The drive.

The idlers may be one of several standard designs, depending upon the material to be handled. Plain cylindrical rolls are generally used for transporting packages.

Capacities of Caldwell Helicoid Screw Conveyors

The following table of capacities is based on actual tests and upon [redacted] experience with conveyor installations. The capacities as given are conservative, but in order to obtain them the feed to the conveyor must be regular, and the hangers must not be so large as to obstruct the flow of material more than the ordinary hanger. The capacities are based on the recommended maximum speed of conveyor for each material. Slower speeds will decrease the capacities in proportion.

Grain

Size of Helicoid Conveyor	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"
Speed, R. P. M.	200	200	190	180	175	175	170	165	165	160	160
Cu. Ft. per Hr.	34	72	175	243	352	734	910	1205	2180	2935	5110
Bushels per Hr.	27	58	140	195	282	586	728	965	1745	2350	4100

Coal

Screenings, or small sized coal, with no lumps larger than 1 inch

*Size of Helicoid Conveyor	7"	8"	9"	10"	12"	14"	16"
Speed, R. P. M.	110	105	100	95	90	85	80
Cu. Ft. per Hr.	269	544	650	838	1460	1905	3260
Tons—(2000 lbs.) per Hr.	6.7	13.6	16.3	20.9	36.5	47.5	79.0

*Small sizes of Helicoid conveyor not recommended for handling coal.

Cement

Size of Helicoid Conveyor	6"	7"	8"	9"	10"	12"	14"	16"
Speed, R. P. M.	125	115	110	100	100	90	90	85
Cu. Ft. per Hr.	167	233	468	541	725	1210	1625	2730
Barrels per Hr.	42	58	117	135	181	303	408	683

It is strongly recommended that wherever possible, conveyors handling gritty or abrasive materials be much larger than the size determined from the preceding tables. The additional life obtained will more than pay for the slight additional cost.

The size of conveyors selected for handling material containing lumps should of course be governed by the size of the largest lumps rather than the required capacity.

Where possible, use low speeds and large conveyors. The preceding speeds are intended as *maximum* speeds, and for long life of the conveyor should not be exceeded.

Table 1.

* All rights reserved by the author.

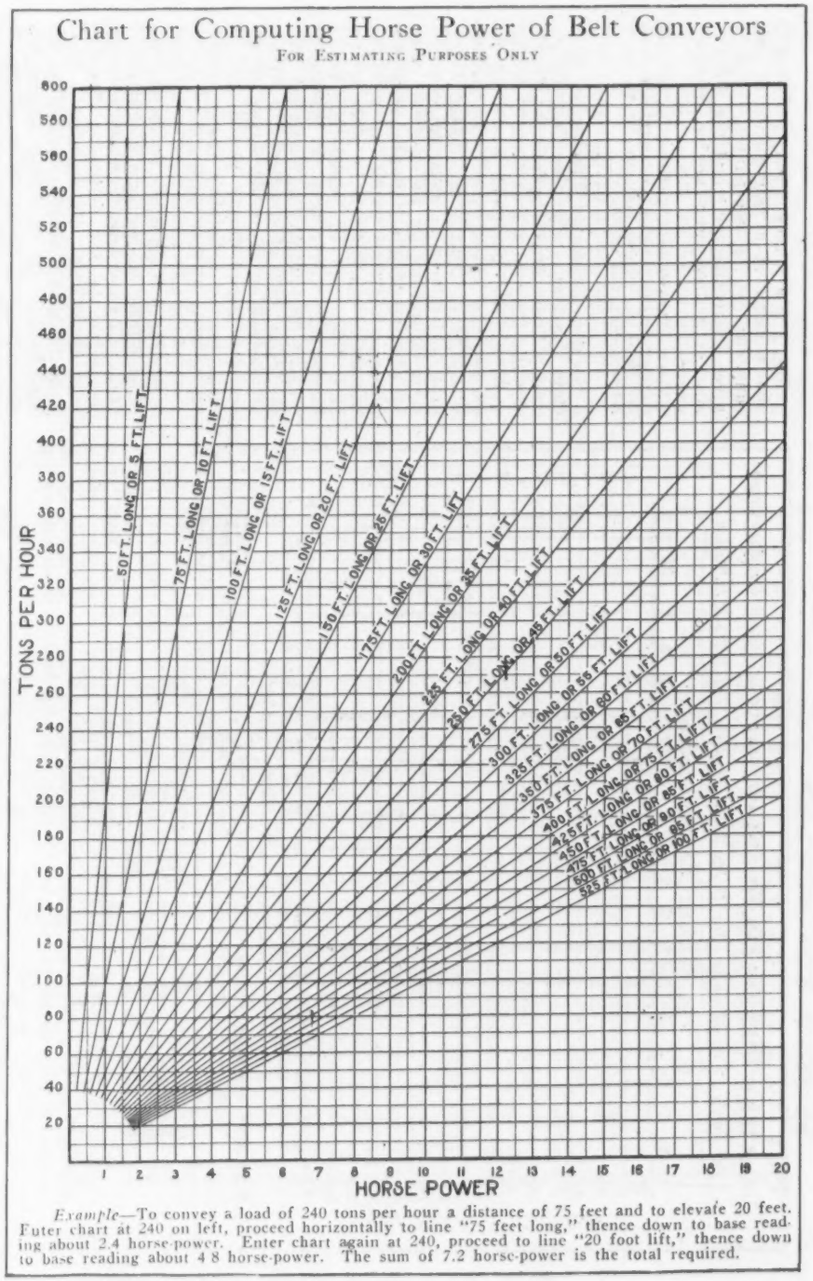


Chart for Computing Horse Power of Belt Conveyors
For Estimating Purposes Only
TONS PER HOUR
HORSE POWER
50 FT. LONG OR 5 FT. LIFT
75 FT. LONG OR 10 FT. LIFT
100 FT. LONG OR 15 FT. LIFT
125 FT. LONG OR 20 FT. LIFT
150 FT. LONG OR 25 FT. LIFT
175 FT. LONG OR 30 FT. LIFT
200 FT. LONG OR 35 FT. LIFT
225 FT. LONG OR 40 FT. LIFT
250 FT. LONG OR 45 FT. LIFT
275 FT. LONG OR 50 FT. LIFT
300 FT. LONG OR 55 FT. LIFT
325 FT. LONG OR 60 FT. LIFT
350 FT. LONG OR 65 FT. LIFT
375 FT. LONG OR 70 FT. LIFT
400 FT. LONG OR 75 FT. LIFT
425 FT. LONG OR 80 FT. LIFT
450 FT. LONG OR 85 FT. LIFT
475 FT. LONG OR 90 FT. LIFT
500 FT. LONG OR 95 FT. LIFT
525 FT. LONG OR 100 FT. LIFT

Example—To convey a load of 240 tons per hour a distance of 75 feet and to elevate 20 feet. Enter chart at 240 on left, proceed horizontally to line "75 feet long," thence down to base reading about 2.4 horse-power. Enter chart again at 240, proceed to line "20 foot lift," thence down to base reading about 4.8 horse-power. The sum of 7.2 horse-power is the total required.

Fig. 1.

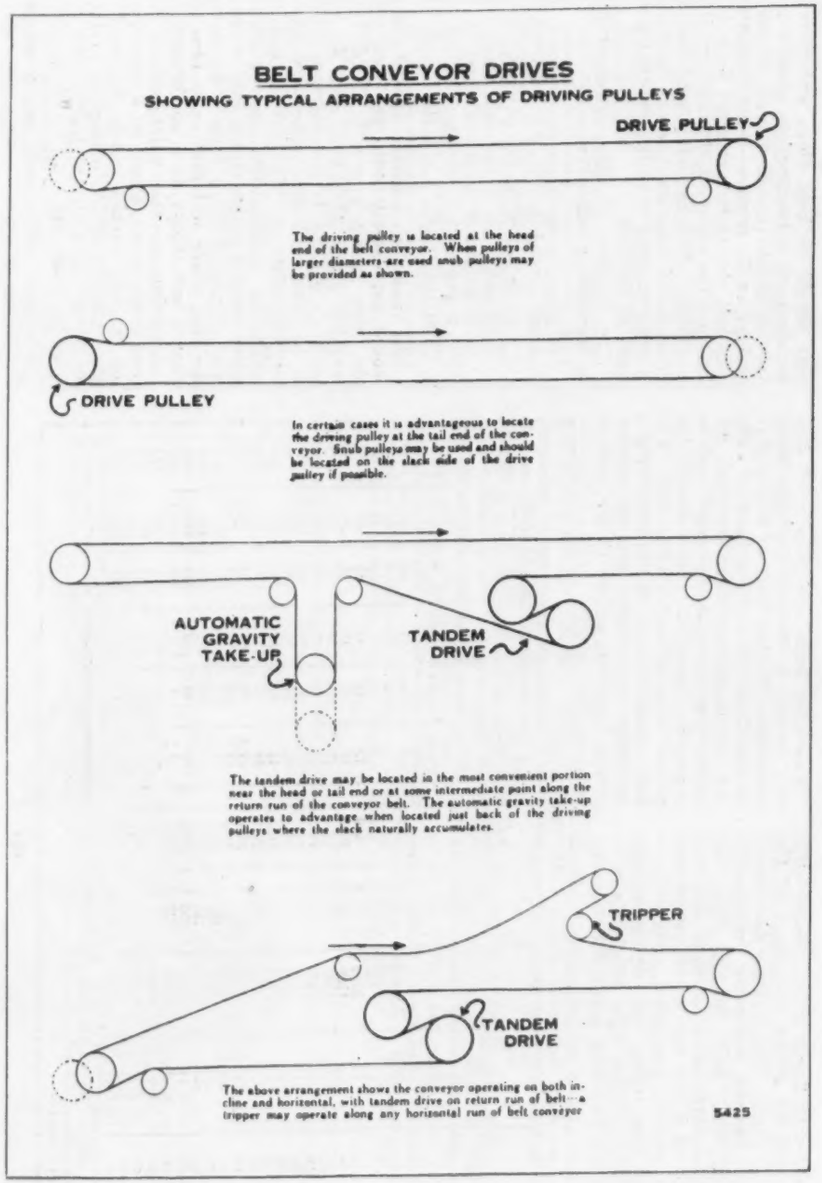

BELT CONVEYOR DRIVES
SHOWING TYPICAL ARRANGEMENTS OF DRIVING PULLEYS
DRIVE PULLEY
The driving pulley is located at the head end of the belt conveyor. When pulleys of larger diameters are used snub pulleys may be provided as shown.
DRIVE PULLEY
In certain cases it is advantageous to locate the driving pulley at the tail end of the conveyor. Snub pulleys may be used and should be located on the slack side of the drive pulley if possible.
AUTOMATIC GRAVITY TAKE-UP
TANDEM DRIVE
The tandem drive may be located in the most convenient portion near the head or tail end or at some intermediate point along the return run of the conveyor belt. The automatic gravity take-up operates to advantage when located just back of the driving pulleys where the slack naturally accumulates.
TRIPPER
TANDEM DRIVE
The above arrangement shows the conveyor operating on both incline and horizontal, with tandem drive on return run of belt—a tripper may operate along any horizontal run of belt conveyor
5425

Fig. 2.
Standard arrangements of belt conveyor driving mechanism.

Rolls with flared or bell shaped ends are used for giving the edges of the belt a slight "dish," thus forming a trough, thereby increasing the capacity of the belt. Belts of this form are used for carrying earth, sand, and materials of a like nature. Combinations of a central horizontal roll with inclined side rolls, thus deepening the "trough" of the belt, are universally used for handling loose materials.

Conveyor belts are usually of canvas, balata, or rubber, the type being determined by the kind of material to be handled. In the purchase of belts for conveyors the reliability and experience of the manufacturer must be depended upon to recommend the proper type of material to use. The belt should trough by its own weight in order to obtain proper guiding action over the rolls. If too stiff it will ride the inclined side rolls, thus injuring the edges of the belt. If too flexible it will have a tendency to crease longitudinally, thus separating the plies.

It is essential that proper alignment be maintained at all times, the belt running true and centrally along the entire length of the conveyor. The belt should be kept clean and if materials have a tendency to stick, a revolving brush (installed near the head pulley) will remove loose material. The belt should be protected from the sun and the elements if maximum life is desired. This can usually be accomplished by the erection of a light wooden housing over the exposed portions of the belt.

The number of plies recommended in standard practice are:

12 and 14 in. wide = 3 or 4 ply.
16, 18 and 20 in. = 4 or 5 ply.
22, 24 and 26 in. = 5 or 6 ply.
28 and 30 in. = 6 or 7 ply.
32, 34 and 36 in. = 7 or 8 ply.
42 and 48 in. = 8 or 9 ply.
54 and 69 in. = 9 ply.

The working tension of the belt should not exceed 24-lb. per inch per ply, this being about 1/16 of the breaking strain of a good belt; 36 lb. per inch per ply is the extreme limit to be used and this only on temporary installations. The life of a conveyor belt is dependent upon a great many factors of operation, and no set rule will apply to all cases. An average rule which will give some idea of what a belt should do is as follows:

Assuming one feed point, and ⅛ in. good grade cover, a belt on a conveyor 100 ft. long should handle during its life a tonnage of 500 multiplied by the square of the width in inches, 200 ft. twice as much, etc.

Advisable belt speeds are given in the following table:

Maximum Advisable Belt Speeds							
Width of belt in inches	12-16	18-20	22-24	26-30	32-36	38-42	44-54
Speed in feet per minute	300	350	400	450	500	550	600

CAPACITY TABLE

Width of Belt in Inches	Cross Section Load in Square Feet	Cubic Feet Per Hour At 100 Feet Per Minute	Cu. Yards Per Hour At 100 Feet Per Minute	Bushels Per Hour At 100 Feet Per Minute	Tons Per Hour at 100 Feet Per Minute — Weight of Material in Pounds Per Cu. Ft.					
					25 lbs. Per Cu.Ft.	50 lbs. Per Cu.Ft.	75 lbs. Per Cu.Ft.	100 lbs. Per Cu.Ft.	125 lbs. Per Cu.Ft.	150 lbs. Per Cu.Ft.
12	.067	402	14.9	322.8	5	10	15	20	25	30
14	.094	564	20.9	452.9	7	14	21	28	35	42
16	.12	720	26.7	578.2	9	18	27	36	45	54
18	.17	1020	37.8	819.1	13	26	39	52	65	78
20	.21	1260	46.7	1011.8	16	32	48	64	80	96
22	.25	1500	55.6	1204.5	19	38	57	76	95	114
24	.30	1800	66.7	1445.4	22.5	45	67.5	90	112.5	135
26	.35	2100	77.8	1686.3	26.5	53	79.5	106	132.5	159
28	.40	2400	88.9	1927.2	30	60	90	120	150	180
30	.45	2700	100.	2168.1	34	68	102	136	170	204
32	.52	3120	115.6	2505.4	39	78	117	156	195	234
34	.59	3540	131.1	2842.6	44.5	89	133.5	178	222.5	267
36	.68	4080	151.1	3276.2	51	102	153	204	255	306
38	.76	4560	168.9	3661.7	57	114	171	228	285	342
40	.85	5100	188.9	4095.3	64	128	192	256	320	384
42	.93	5580	206.7	4480.7	70	140	210	280	350	420
44	1.03	6180	228.9	4962.5	77.5	155	232.5	310	387.5	465
46	1.16	6960	257.8	5588.9	87	174	261	348	435	522
48	1.29	7740	286.7	6215.2	97	194	291	388	485	582
50	1.45	8700	322.2	6986.1	109	218	327	436	545	654
54	1.82	10920	404.4	8768.8	136.5	273	409.5	546	682.5	819

NOTE—The figures given in the above table [redacted] are based on capacities computed for belt conveyors operating on the horizontal and on an incline up to and including 18 degrees.

Fig. 3.

One of the most important points to be provided for is the proper lubrication of the rolls. Belt roll speed is usually 200 to 400 r.p.m., and proper lubrication is necessary to reduce wear upon the belt and to decrease power consumption. With a properly designed system of rolls the bearings require attention only at intervals of several months. The labor cost of inspection and maintenance is very low under these conditions.

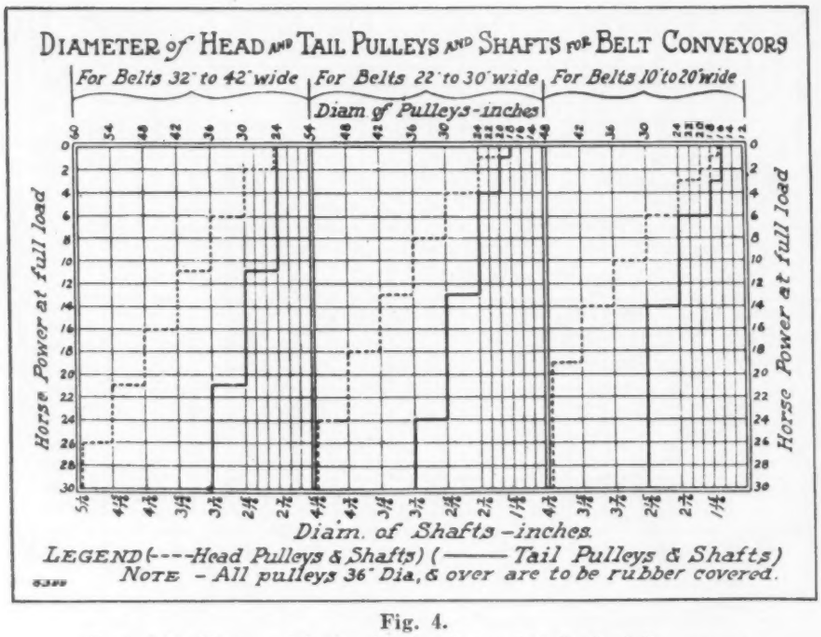

DIAMETER of HEAD AND TAIL PULLEYS AND SHAFTS FOR BELT CONVEYORS
For Belts 32" to 42" wide
For Belts 22" to 30" wide
For Belts 10" to 20" wide
Diam of Pulleys-inches
Horse Power at full load
Diam. of Shafts-inches
LEGEND (---Head Pulleys & Shafts) (——— Tail Pulleys & Shafts)
NOTE - All pulleys 36" Dia, & over are to be rubber covered.

Fig. 4.
Chart giving diameter of head and tail pulleys and shafts for belt conveyors.

Fig. 1 is a horsepower chart. Fig. 2 shows standard arrangements of belt conveyor driving mechanism. Fig. 3 gives a capacity table and Fig. 4 shows size of pulleys and shafts for conveyors.

Note: The writer is indebted to Stephens-Adamson Manufacturing Company and Link Belt-Meese & Gotfried Company for the tables accompanying this article.

Booklet Advocates Placing of Cut-Outs Upstairs.—"Can the Electrical Industry Learn Anything from the Plumbing and Hardware Industries?" A well written little pamphlet has been issued by the Mutual Electric & Machine Company, of Detroit, and makes its appeal particularly to electrical contractors. It brings up the methods used by the plumbing and hardware people in educating the public up to finer bathroom installations in place of tin bath tubs, and of demanding better hardware. Advocating the selling of quality installations of electrical wiring, the booklet particularly treats of the selling of outlet boxes of attractive design to be placed on the main floor of a building easily accessible in case of fuse burn-outs.

Insurance Company Advertises for Safe Wiring in National Magazines.—In a full page advertisement in color, appearing in the Saturday Evening Post of Aug. 14, the Insurance Company of North America advocates the consultation of reputable electricians for making all home electrical installations. The "ad" warns against improper or "home-made" installations, neglect of needed repairs, electrical

Questions and Answers on the Code and Safety Orders

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of the Journal of Electricity such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

All who are interested are invited to send in their inquiries regarding the National Electrical Code to Claude W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, Calif., or to the Editor, Journal of Electricity, 883 Mission Street, San Francisco. Questions on the Safety Orders should be sent to George E. Kimball, Industrial Accident Commission, State Building Civic Center, San Francisco, or to the Editor.

Q. On power installations, will current transformers be accepted when isolated by height, instead of enclosed in a metal cabinet. If so, please state where this is noted in the State Code.

A. Instrument transformers operating on circuits of 600 volts or less may be isolated by elevation if located in a place where they are not subject to mechanical injury, or exposed to excessive moisture or similar conditions. Provision is also made for mounting them on the rear of switchboards. Electrical Safety Order 707-10(c), (d) and (e) refers to the installation of instrument transformers used in connection with meter installations. Order 711-12 gives the general requirements for enclosing, guarding and isolation.

Q. Are there any fees for having work inspected by State inspectors?

A. To date the Industrial Accident Commission has never made a charge for an electrical inspection. All requests for inspection and all complaints of unsafe conditions are held until a regular inspection trip is made into the district from which the request is made.

Q. What state rules cover the installation of pole lines by private parties, on their own land?

A. General Order 64, Rules for Overhead Line Construction, issued by the California Railroad Commission. These rules are also adopted by reference in the Electrical Safety Orders under the sections covering services, Order 707, and yard wiring, Order 706-1.

Q. Does an electrical contractor, working outside a city (in the country), need to obtain state inspection on the work installed in a factory? If so, where does he apply for such inspection?

A. An electrical contractor may complete an electrical installation without state inspection. The Industrial Accident Commission holds the employer responsible for an unsafe place of employment and if on inspection at any time unsafe conditions are found the state inspector will order the employer to correct them.

Q. Does an externally operated switch in an industrial plant have to be of the dead-front type?

A. The so-called "dead front" switch is one of the many forms of safety type switches. They are usually assembled on switchboards and panel boards and not installed as individual units. Their use in industrial plants is very common. All circuit switches and motor starting devices must be of the safety type. See Electrical Safety Orders 709-2(f) and 711-9. For panel boards see order 710-5. The following is a definition taken from page 15 of the Electrical Safety Orders:

SAFETY TYPE SWITCH means a switch which is so designed and constructed that no current-carrying parts are normally exposed when the switch is in "off" position or in "on" position, and so designed that the operator can not come into contact with the current-carrying parts during ordinary operation. This term includes so-called dead-front, guarded, enclosed (externally operated), flush, snap, tumbler, plunger, and similar types of switches, which meet the above requirements and which are rated as approved. Such rating shall cover the complete device, including the enclosing and operating mechanism.

Q. National Electrical Code Rule 3802 calls for the metal used in the construction of sign boxes, etc., to be galvanized, treated with at least three coats of anti-corrosive paint, or otherwise suitably protected from corrosion. Does this mean that galvanized metal must be painted?

A. Metal properly galvanized need not be painted. To comply with requirements of Section 3802a, metal shall be galvanized or treated with at least three coats of anti-corrosive paint, or otherwise suitably protected from corrosion.

What the Red Seal Plan does

The Red Seal Plan was created to give the home builder a positive assurance that his home is adequately wired to meet definite standards of electrical convenience. This plan is backed by the Society for Electrical Development, and any home bearing the Red Seal bears the approval of the electrical interests of this community. Such a home is marked as a home of electrical refinement.

Who ever heard of a Red Seal?

ELECTRIC HOME

THE RED SEAL
The Symbol of Adequate Wiring. Copyright, 1926, by The Society for Electrical Development, Inc.

THERE'S nothing odd or strange about the Red Seal to thousands of folks whose homes have been wired to Red Seal standards.

For the Red Seal is to them the mark of the modern home—completely and properly wired to meet definite and desirable standards. These standards mean that you will have switches and convenience outlets where you need them — no more long unsightly extensions to clutter up the rooms.

Plenty of switches, properly placed—no more stumbling in the dark. Lighting fixtures that put the light just where you need it—no more reading or working in gloom and glare.

If you want to know anything about a Red Seal Home see your electrical contractor or get in touch with the local Electrical League.

The Graybar quality tag—under which 60,000 electrical supplies are shipped

GraybaR QUALITY Everything Electrical GraybaR ELECTRIC COMPANY

GraybaR

ELECTRICAL SUPPLIES—WHOLESALE ONLY
Successor to *Western Electric* Supply Dept.

Co-operating with the Red Seal plan in excellent fashion is the Graybar Electric Company. Among its many recent excellent advertisements on good wiring and wiring materials this advertisement on the Red Seal plan was run throughout Western newspapers.

BETTER MERCHANDISING

Dealer Advertising: How, When, Where?

The small Electrical Store May Use Advertising Successfully If it Does so Persistently, Sensibly—and with Courage

By RICHARD E. SMITH, Advertising Manager, Southern California Edison Company

This article starts with the assumption that the electrical dealer recognizes the value of advertising as an integral part of any well organized business. If he is one of those who say, "It does not pay to advertise," he should take the advice of a wise man who said, "If your business is not worth advertising, advertise it for sale."

It is generally known that the small dealer who needs advertising most does not get anywhere near the proportionate return on money spent for advertising as does the large dealer. This is due to two things: First, because the smaller dealer dissipates much of his advertising money on novelties, programs and similar schemes which offer no return and, second, he does not give the thoughtful preparation to advertising that his large competitor demands.

It will be the purpose of this article to take the case of an imaginary electrical dealer whom we shall term the Kingville Electric Company. We shall attempt to lay out an advertising program for him, show him how his money should be spent and give him some simple rules for comprehending the purpose of advertising. Obviously it will be out of the question to discuss the technicalities of this craft, and, as a matter of fact, a knoweldge of advertising technique is not particularly necessary to a small dealer, provided he can understand its human aspects.

Take Kingville, for Instance

We now enter the office of the Kingville Electric Company and ask its manager two pertinent questions. The first is, "Are you ready to advertise?" Nothing can be gained and a great deal may be lost by inviting people to trade at your store before you are ready to serve them. If you advertise "Everything Electrical" and then have to explain to your customer when he comes that the article he wants is not in stock, you have put him in a frame of mind where he will not want to come back and more than likely he will tell some of his neighbors what he thinks of you.

Before starting to advertise the dealer should ask himself the following questions: Have I a good store? Is it in a good location? Is it on the right side of the street? Is it stocked with fresh merchandise? Is it manned by people who understand the stock, the customer's needs and the relation of the stock to the customer? Is it well lighted? Is it well ventilated? Is it a place where my wife would want to trade?

It Takes "Abdominal Fortitude?"

The second question is "Have you the courage to advertise?" Of all the essential elements of any business, advertising demands the most **courage.**

We have to pay rent or lose our lease. We have to pay the jobbers' invoices or lose our credit, but we do not have to advertise and when we have a bad month, there is a tendency to discontinue our publicity at the very time when we need it most.

One of the first rules of advertising is that it must be persistent. Some magazines insist on a well laid-out campaign or they will not allow advertising to appear on their pages. The reason for this is that their own reputation as a successful advertising medium is at stake and they know that two or three scattering insertions probably will not produce enough business to pay the advertising bill and the magazine will get a black eye. One large magazine will not take an advertising contract for less than thirteen insertions.

Now that the Kingville Electric Company has assured us that it is ready to advertise and has the courage to carry on, we shall endeavor to map out a sensible program for them.

How Much Will It Spend?

Before making a move, we must decide on how much money will be available. Small dealers as a rule seem not to understand this and go ahead on a hit-or-miss plan with disastrous results. Every large advertiser gives himself a definite budget for the year's work, generally based on a percentage of his gross business. The small dealer should do the same.

Just what this percentage should be is governed largely by what others are doing. Some manufacturers of specialties allow as much as 10 per cent of their gross receipts for advertising. On the other extreme are grocery stores and similar concerns dealing in staples which spend but 2 per cent. In between we shall find 4 per cent for men's clothing, 5 per cent for shoes, 6 per cent for pianos and radios and so on. No electrical man should expect to get results on less than 3 per cent of his gross receipts and this is the amount we shall put down for the Kingville Electric Company.

We shall set an arbitrary figure of

"Dick" Smith

is qualified to discuss dealer advertising.

For some years he ran an electrical contracting and merchandising establishment of his own.

He has been advertising manager for the Southern California Edison Company for a number of years, planning that company's merchandising advertising in its various campaigns.

He is chairman this year of the Advertising-Publicity Section, P.C.E.A.

He was asked by the California Electragists, Southern Division, to tour with its last Institute, presented to dealers in various towns in the Southenr Division, to give them practical, working rules for contractor-dealer advertising.

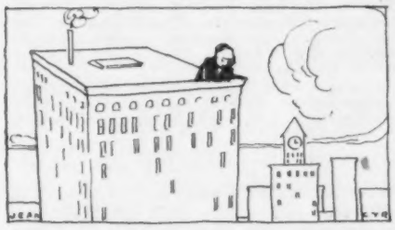
This article "Dick" Smith wrote from the instructive talk he gave to the electrical contractors and dealers during the Institute classes.

"Let's see, now, it won't do to advertise this here store. One look would send 'em somewhere else."

"Have I courage, or haven't I? That is the question." Not Shakespeare but a dealer looking advertising in the face.

$30,000 as the annual gross receipts, for it is the dealer doing about this volume of business who is most in need of constructive advice about advertising.

Three per cent of $30,000 is $900, the advertising appropriation of the



Get up on the town's skyscraper, if any, and give it the once over. Say to yourself, "Out there are my customers—"

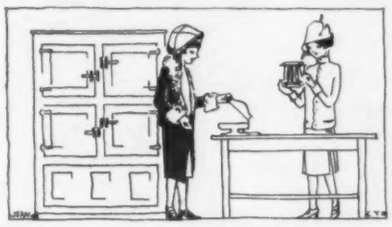
Kingville Electric Company for the year. This will give it $75 a month or about $18 a week to tell the story of its goods and services to the public.

Where Does the Money Go?

The next question is, how shall we spend this money to reap the greatest benefit? It is apparent that we must be extremely thrifty. If we give $5 to the Firemen's Ball, $10 to the Lions' Club picnic, $20 to the Chamber of Commerce excursion and so on, our $900 will not last long. If money must be given to these appeals, do not charge it to advertising. If your system of accounting does not provide for charities and donations, these gifts should be taken out of your personal salary, as they are not a fair charge against the operation of your business.

The only place that the Kingville Electric Company can afford to spend its advertising money is in the newspapers, and as there are two papers in Kingville all of this money should be concentrated in one of them, as $9 a week will not buy much in either paper. If it is necessary to divide the business between the papers, a plan might be worked out whereby the Kingville News would carry it from January to June and the Kingville Courier from July to December.

The better plan, however, is to confine it to one paper and tell the other something like this: "We recognize the value of advertising and we hope by using it constantly to build up our business to the point where we can use both papers. At the present time, if we attempt to use both, we think



There are "unknowns" and "half knowns" in appliances. Take the mystery out of them and women will buy.

that results would be disappointing and none of us would be benefited."

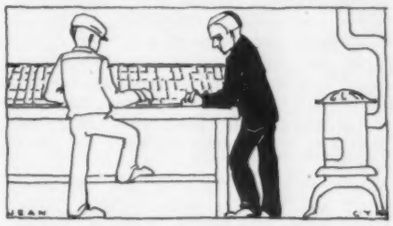
Advertising is sold by the column inch, that is to say, one column wide and one inch deep. For a paper like the Kingville News the rate probably would be 40 cents an inch. Therefore our appropriation of $75 a month would be 187 in or about 47 in. a week. This will give us approximately a quarter page advertisement once a week, but if this is a daily paper we may choose to use a smaller space two or three times a week. For example, we might have a 2 column x8 in. advertisement on Monday, a 1 column x 10 in. advertisement on Wednesday and a 2 column x 10 in. advertisement on Friday, thus giving three respectable advertisement during the week and yet using only 46 in. of our space.

The beautiy of this budget system is that the advertiser knows exactly how much space he is entitled to and can spend the money with a clear conscience, realizing that he has provided the $900 to cover the expense for the year. For example, in the case we are considering the Kingville Electric Company may have a special event which will justify a half-page advertisement. This can be done by skipping the following week and then going back to the original schedule.

What to Say

Having arranged for this space, the next question is, what are we going to say in it. This leads to a discussion of the preparation of advertising copy which will be difficult in an article of this length. However, we shall make a try at it.

A primary difficulty with the novice is that he persists in writing about an

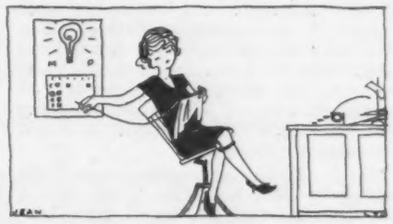


The town printer will help you with advertisements. He knows type and style even if he doesn't know watts and ohms.

article rather than about what it will do. To avoid this tendency, the advertiser should climb to the top of the highest hill or the highest building in his neighborhood and look over the surrounding country. Then let him say to himself, "Out there are the people who will ready my advertisement tomorrow. Who are they? What are they doing? How many of them really need a vacuum cleaner? What will a vacuum cleaner do for them? Why should they buy it instead of a clock, a new dress or a cedar chest? If I called on these women individually, what would I tell them about my vacuum cleaner?"

Now we are in the proper mood to sit down at our desk and write an advertisement about a vacuum cleaner which may be expected to bring some results. To describe the revolving brush, the ebony handle and the nickel finish will not do much good. To talk about freedom from backache and having a few hours leisure to go visiting or shopping will put the desired note into the argument.

If an advertising expert were called in by the Kingville Electric Company to suggest a plan for it he automatically would divide the goods and services of the Kingville Electric Company into three classes, and any novice who follows this rule will find his advertising greatly improved. The first group in this classification is "Unknown and unwanted." The Fiji Islander who has never seen a phonograph knows nothing about it and does not want it. Your prospect who knows nothing



Don't blame your office girl if she takes a stitch in time. Give her nine letters to write instead.

about an electrical refrigerator does not want it and she will not want it until we begin telling her how her domestic economy can be improved by installing this new device.

The Three Classes of Merchandise

The second group of articles is labedel, "Half known and half wanted." Into this group we will put the waffle iron, the ironer and the table lamp. Every woman has a half-formed knowledge of these appliances and also a half-formed desire to have them.

The third group contains articles of such common use that they are called "Known and wanted." A good example of this classification is potatoes, for everybody knows about potatoes, everybody wants them and when the supply of potatoes runs low our first impulse is to run to the nearest market and get some more. In this group we will find lamps, fuse plugs, dry cells and similar electrical staples.

It is at once apparent that a very different style of advertising is needed to sell electrical refrigerators than would be employed to market potatoes. Therefore, when writing advertising we first must put the article in its proper group and then use the right sort of argument to promote the sale.

The tendency of amateur advertisers is to make their story so short that it is incomplete. Advertising must be brief and advertisements of less than fifty words are quite common, but careful examination of good advertisements will show that they are always complete. For the beginner it is a good rule to write out the whole story and then condense it into the form of a night letter.

Accidents happen in the best butcher shops. When they do, let the butcher think of you—kindly of course.

Let the Newspaperman Help

Unless the advertiser knows a great deal about type, it is better for him to leave the details of arranging the advertisement to the newspaper. Every newspaper of any importance has a service department in which there is a

man trained in the art of laying out advertisements. His services are free, yet very few people know about him and still fewer take advantage of his service.

It is particularly desirable to call on this man when starting out to advertise for the first time, as the success of the campaign will be much more certain if it is given a distinct style. This may be accomplished by the arrangement of type, the use of illustrations, the selection of a border, or a combination of all three. Having once selected a suitable style, it is not advisable to change it.

Many good advertisements are spoiled by poor headlines. We should bear in mind that our prospective customer will spend less than thirty minutes in reading the entire paper in which our advertisement appears and we have to compete with the whole gamut of world news to get his attention. The headline must be definite. To say "Announcement," "Special Sale," "Unusual Bargain" or "Just Received from New York" is not enough, for such headlines would apply to lawn mowers, golf sticks, talcum powder and canned peaches as well as to electrical merchandise.

Try to get the whole theme of your advertisement into the headline. Do not try to limit it to four words if seven or eight words are necessary to give a complete message. For instance, if you have just worked out an arrangement with the Royal vacuum cleaner whereby you can sell this for a down payment of $5 during the month of October, your advertisement should have this headline "$5 puts a Royal Cleaner in Your Home—October Only." Such a headline catches the attention of every woman who is at all interested in having a cleaner. It tells her the sort of cleaner you are talking about. It explains definitely the amount of money she must spend to get one and it informs her that she must act at once to take advantage of the offer. Having read this much she will go through the advertisement to get further particulars.

Here is another example. If you are selling electric ranges, do not write a headline like this: "Cook with Electricity." It is much better to say, "An Electric Range Means a Cool Kitchen," or "An Electric Range Actually Saves Food." Such headlines arouse interest to the point where the whole advertisement will be read and a reasonable number of prospects will be influenced to the point of coming to the store for further information. That is all that we can expect any advertising to do for a retail establishment.

Using the U. S. Mails

So far we have confined this discussion to newspaper advertising, as it was our desire to emphasize the importance of concentration. However, there are other forms of advertising, particularly direct mail, which should not be overlooked. A great deal can be done along these lines without spending very much money. Every envelope that leaves the office should carry some sales message. Even if you send out only ten letters a day, this will amount to three thousand in a year and three thousand messages about your goods and services are not going to do any harm.

It has been the writer's observation that in the typical small establishment there is generally a girl on duty whose business it is to make out bills and answer the telephone. Quite frequently she has enough leisure to do some embroidery or read a magazine. She is not to be blamed for this if her manager has not arranged enough work for her. The point is that she could very well write a few letters each day to the people in your neighborhood whom you would like to have on your books.

What would happen if you made a list of all the butchers within your trading area and wrote a letter something like this:

Dear Sir:

Some day you are going to want an electrician in a hurry and when that time comes, it will pay you to remember the Kingville Electric Company, for when you send a hurry call to us, our response is as prompt as the fire department.

You have in your shop an electric meat cutter, a refrigerator, a cash register and other devices, any one of which may get out of order in the busy part of your day. These electrical appliances are all well made and we hope nothing ever happens to them, but if anything **should** happen, that is the time for you to use the telephone.

Here is a card with our name and telephone number on it. Tack it on the wall by your telephone so it will be handy when you need it.

Yours truly,

KINGVILLE ELECTRIC COMPANY.

Having written such a letter to the butchers, you could send another one to grocers and then to dry-cleaning plants and then to beauty shops and then to drug stores until without any extra effort or any noticeable expense such messages have gone to most of the business houses in your territory. Nothing remarkable is going to happen as a result of such a campaign and yet by keeping this up for six months or so, there will be established in the minds of your neighborhood that when they want electric service the Kingville Electric Company is the place to get it, and such a reputation, even if it is founded only on advertising, is greatly to be desired.

The title of this article is, "How, When and Where the Electrical Dealer Should Advertise." The answer to the question "how?" is "systematically." The answer to "when" is "all the time." The answer to "where" is "in the newspapers and by mail, concentrated in the area where the dealer operates."

If the Kingville Electric Company adopts this plan and follows it consistently, it will find after a few months that almost without its knowledge new accounts, new inquiries and new customers are coming to the store and that advertising instead of being an expense has proved a definite asset.

We acknowledge with thanks the receipt of your payment, and hope we may have the pleasure of again serving you in the near future.
The McNally Company
ELECTRICIANS
"Put it in conduit"
INDUSTRIAL Electric NEWS
East and West Paper Pulleys Are
Choice of Leading Manufactur
Concerning C. T. Smallcomb's Business
SPENCER ELECTRIC CO.
320 TWELFTH STREET

Excellent example of well planned electrical contractor-dealer advertising. At the left are three advertising pieces used by McNally Company, Pasadena, an acknowledgment of payment, a reminder on the back of each envelope to use conduit, and a good-will card. At center is reproduced an unusual contractor house organ, being sent to all customers and prospects. At right are other direct-mail pieces of merit.

"Don't Advertise Unless You Have Plenty of Sand"

"As a piece of advice to dealers who are contemplating a campaign of a nature similar to that we put on for the sale of cookers, I would like to say, 'Don't start unless you have plenty of sand to go through with an expensive advertising campaign,'" writes J. C. Hobrecht, of J. C. Hobrecht Company, electrical dealer of Sacramento whose experience in merchandising has entitled him to a position of authority.

Mr. Hobrecht goes on to say that in the campaign he staged in Sacramento during the month of June, he found that each advertisement only carried the sales for about two days and after spending considerable money in advertising found that a great majority of the public did not know what it was all about. "After spending all this money to tell the public about the cooker," says Mr. Hobrecht, "people would come in, responding to our advertisement which probably they had read from start to finish and ask such silly questions that it would seem they did not understand the very simple language of our advertisements.

Examination of one of the advertisements used by Mr. Hobrecht, reproduced in connection with this article, reveals that it could hardly have been written more simply, and yet, according to Mr. Hobrecht, it seemed to register on about half of those who read it.

Nevertheless, the advertising did bring people to the store, as a summary of the campaign would indicate. The sale opened on June 2, being announced by a full page advertisement in both Sacramento papers. Later in the week a 60-in. advertisement was run in one paper. The following week a 60-in. and a 40-in. advertisement was run in each paper. The third week a 40-in. advertisement in each paper and during the last week of the campaign a 60-in. advertisement in both papers and two 6-in. advertisements on the day before the sale closed, finished the campaign.

In addition to the newspaper advertising 10,000 broadsides were sent out to the power consumers in the city and 5,000 stuffers were used by the power companies and Hobrecht in the mail. The power companies also co-operated by loaning their demonstrator for one day.

The campaign sold 1,500 Everhot cookers. In spite of delays in shipments from the factory, held up en route, losing a number of sales for which they could not make immediate delivery and some "future delivery" sales which were cancelled because of these delays, Mr. Hobrecht says that he feels the sale justified the big advertising expenditure. It brought some 800 new customers to the store and gave the store considerable general publicity.

"We believe campaigns of this kind are good as a stimulator, periodically," concludes Mr. Hobrecht. "Of course there is no profit in them. It is very likely that the 1,500 cookers we sold, if all expenses were charged, would be found to be sold at a loss. However, we have still a fairly healthy demand for these cookers at this time at the standard price of $11, and it is very likely that we shall finally come out with a profit on the transaction."

New Range Campaign Launched by Puget Sound Company.—Following a successful range campaign just completed, the Puget Sound Power & Light Company has started another range campaign throughout its territory in Washington. Starting in August the campaign is to last two months. Westinghouse ranges are the basis of the drive. A list of prizes is offered both individuals and managers in the contest, besides commissions to employees selling the ranges.

El Paso Refrigeration School Course Completed.—A special course in electric refrigeration sales has just been completed at the El Paso Electric Company, El Paso, Texas. The classes were held in the new service building and were conducted by M. H. Spreen of the Kelvinator Corporation, Detroit.

We Have Just Received Another Large Shipment of
Everhot
Electric Cookers
We will continue the unusually low price of
$8.95
Complete with two utensils, plug, cord and tongs.
Shipped anywhere in the state for 25c extra.
You may cook in the Cooker itself which holds 5 quarts or in the two utensils which hold 2 quarts each. Size of cooker is 14 inches high by 10 inches diameter.
Everhot
You May Pay Only
$1.95
Down and $2.50 per month for three months
It has taken the whole state by storm. We have been unable to supply the demand---regular shipments are now coming in and we expect to make regular deliveries. Phone or mail orders filled promptly as possible.
A Welcome Change in Cooking Methods
What Users Say About Them
One lady reports: "I am cooking the entire meal for a family of six, meat and vegetables at the same time, and after I take them out I cook a pudding without turning on any more current."
Another reports: "My family likes ice cream and frozen dainties, and with the Everhot it is certainly easy to make them. I leave them in just 2½ hours and it freezes them just right."
Still another: "We find the same cuts of meat are cooked very much more tender in the Everhot than they formerly were in the oven."
In the short time since this sale started we have had many reports like the above. Never have we seen anything about which users were so enthusiastic.
Anyone can use it, nothing hard to learn.
The Greatest Electrical Cooking Device Ever Offered
So easy to use and no work to keep clean. Hot enough to beautifully brown a big roast, yet there is no heat in the kitchen.
Also a Big Thermal Jar
You can use Everhot just as you would a vacuum bottle to keep things hot or cold.
Ideal for the Picnic Lunch—
Start your Everhot at home, let it do the cooking while you're driving to the picnic place. It will keep hot for hours.
Relief from the Hot Kitchen Stove
Everhot will fry steaks or chops, bake cakes or biscuits, roast any kind of meat or fowl, boil or stew meats or vegetables without heating either the cook or the kitchen.
Why stand over a hot stove when you can get relief for so little money?
We Must Raise the Price to $11.00 on July 1st.
ELECTRICAL
HOBRECHTS
DEPENDABILITY
Remember, Sale Lasts Month of June Only.

Advertisement used by J. C. Hobrecht Company of Sacramento in a cooker sale disposing of 1,500 cookers. In spite of simple language used, Mr. Hobrecht says, people only half understood what it was all about, but nevertheless came to the store to find out.

NEWS OF THE INDUSTRY

Ryan Laboratory at Stanford Dedicated as Two Million Volt Tests Are Conducted

Two million volts discharge bridged an air gap of 240 inches in a test of the world's highest voltage apparatus and provided the dramatic touch requisite to the formal dedication of the Harris J. Ryan Electrical Laboratory at Stanford University, Friday, Sept. 17. With President C. C. Chesney of the American Institute of Electrical Engineers and a host of other notables in attendance the 2,000,000-volt tests formed a climax to the simple dedicatory exercises in which Dr. Ray Lyman Wilber, president of Stanford University and C. C. Chesney took part. More than 300 people, power company and manufacturers' representatives, university officials, and representatives of the press, witnessed the demonstration of high voltage discharge.

Dr. Ray Lyman Wilber, president, Stanford University, opening the exercises, spoke briefly upon the reasons why the laboratory had been located at Stanford, which he said was in order to further the research of Dr. Ryan in this work which is of great importance to Western development. He spoke of the co-operation between power companies, the General Electric Company and officials of the university in establishing the laboratory and predicted that its presence would be one of the greatest stimulii to students of electricity in the West.

C. C. Chesney, newly elected president of the American Institute of Electrical Engineers, then spoke. He commented on the pleasure afforded him at the convention of the Pacific Coast Division of the A.I.E.E. at Salt Lake City, Utah, in presenting the Edison Medal to Dr. Ryan for "his contribution to the science and art of high tension transmission of power." From Salt Lake, he said, he had come to Stanford to witness the dedication of the laboratory in Dr. Ryan's honor.

Dr. Ryan, acknowledging the honor conferred upon him, expressed his appreciation of the naming of the laboratory for him and then went on to relate to his visitors the purpose of the laboratory and what experiments they would witness that afternoon.

"Sixty per cent of the available water power of the United States is located on the Pacific Coast and back country," Dr. Ryan said. "Sources are usually 100 to 200 miles from their market centers. The growth of the Pacific Coast population makes it a reasonable assumption that by 1935 all of the water powers within the economic reach of the Coast region will have been developed and put to use. The progress of the far west is extraordinary and has been made possible only through economic power communication. If such progress is not to be reduced greatly after ten years, advances must be made in the technical knowledge of high voltage. It is the manifest duty of all responsible for the progress of the power industry of the far West to co-operate in educating and training men and accomplishing the requisite researches."

Two tests were conducted, each three times in succession, for the full benefit of the large group attending. The first test employed two large plates of galvanized steel, 5 x 8 ft. in size and 4 or 5 inches in thickness, suspended from the high roof of the large hangar-like laboratory. Current to these plates, which were placed 220 in. apart, was gradually brought up to a pressure of 2,000,000 volts. The laboratory being in total darkness Professor Ryan was able to point out the various corona phenomena resulting.

The second series of tests were conducted with two tapered, pointed steel rods, ⅝-in. in diameter, placed at a distance of 240 in., or 20 ft., apart. Again the voltage was raised until the gap was bridged by an arc, ribbon-like in form.

This is the first time voltages of as high as 2,000,000 volts have been used and marks the successful culmination of several years work in the establishment of the Ryan Laboratory. The laboratory is located on ground appropriated for it by the university, south of the campus, between Pine Hill and the Mayfield reservoir. A strip of ground 100 yards wide and a mile and a quarter long is the present area to be used, with provision for a 7-mile strip available when the experiments reach the stage requiring it. The laboratory building is 173 ft. long and 80 ft. wide. The roof is supported by trusses to leave the interior free of supporting columns. The height from the concrete floor to the underside of the trusses is 50 ft. For safety to life and equipment clearances of 20 ft. have been allowed on all sides of the apparatus.

The transformer set consists of six coupled-winding transformers. The coupled winding, developed by A. D. Hendricks, chief of the high voltage laboratories and shops of the General Electric Company, provides two primary and two secondary windings in each transformer, which give more adequate voltage control. A separate voltmeter winding in each transformer makes possible readings with a guaranteed accuracy of within ½ or 1 per cent, it is claimed.

Dr. Harris J. Ryan (left) at the control board of the new high voltage laboratory recently dedicated in his name at Stanford University. With him is Allan B. Hendricks, consulting engineer of the General Electric Company, dasiger of the transformers used in the laboratory by which voltages up to 2,000,000 can be produced. At the top of the picture may be seen part of a 2,000,000-volt discharge across a gap of 20 ft.

Two motor generator sets, each with 500 kva. motors connected to a 1,050 kva. sine-wave generator, furnish power to the transformers at 2,300 volts. The motors operate off the 4,000-volt system of the power company.

The large laboratory is provided with sliding doors allowing one whole side of the building to be opened. When closed and lights extinguished the laboratory may be kept in complete darkness. In connection with the laboratory, the building is arranged for sound proof rooms adjoining the laboratory for the switch and the motor generator equipment so that noise from these will not be heard while experiments are being conducted in the main laboratory. A seminar room, dark room, oscillograph room and offices are also part of the laboratory plant so that students do not have to leave it for class or special work in connection with the experiments.

A. D. Hendricks, designer of the transformers and much of the equipment, was present at the dedication. He arrived at Stanford shortly after the transformers were received and remained to assist in the installation and preliminary testing of the apparatus, a period of eight weeks. He left for the East following the successful tests at the dedicatory exercises. Prof. J. S. Carrol, assistant to Dr. Ryan, assisted with the experiments, throwing the switches and attending to the apparatus.

Among other distinguished guests of the day were F. W. Peak, Jr., consulting engineer and expert on lightning study for the General Electric Company; A. G. Wishon, president, San Joaquin Light & Power Corporation, Fresno; Paul M. Downing, vice-president for the Pacific Coast Division, A.I.E.E.; and engineers from nearly all power companies in California.

Camp Co-operation VI Termed Most Successful Held

The fifth conference of electrical leagues held at Association Island, Henderson Harbor, N. Y., Sept. 1-4, closed with the annual banquet which marked the most successful conference of its kind yet held in the industry.

All parts of the United States and Canada were represented and the number of conferees totaled 282. At this conference 75 electrical leagues were represented.

In addition to the general business program the following special meetings were held—the directors of the society; leagues licensed to operate the Red Seal plan; advisory publicity council; league council; secretary managers of leagues and individual members of the society.

The business program was well balanced and designed to cover all the important phases of local co-operative business development work. Speakers representing all branches of the industry participated in the discussions. A well organized program of sports and entertainments contributed to the pleasure of the conferees. Some 34 prizes were awarded for golf, tennis, bowling, yachting, bridge, horse-shoe pitching, photography, etc. Many of these prizes were donated by leagues, this being the first conference in which they have participated in this manner.

Labor Convention Declares for Water and Power Act

Among the resolutions endorsing various measures on the November ballot in California, the California State Federation of Labor in its convention in Oakland, Sept. 22, went on record as favoring and endorsing the Water and Power Act.

Similar action was taken by the labor federation in previous campaigns to pass the $500,000,000 proposal. Labor councils of various trades, during the last campaign on the Water and Power Act, in 1924, sent out propaganda favoring the act and citing numerous examples of public ownership alleged success in support of the proposed water and power governmental scheme.

Second Skagit Unit Funds Sought As Plans Are Completed

First steps have been taken by the Seattle, Wash., city council to provide funds for building the second unit of the Skagit River power project, a masonry dam and power house at Diablo Canyon, and an extension of the city's railway to the canyon from its present terminus at the Gorge Creek plant. Chairman Tindall of the council utilities committee has requested T. J. L. Kennedy, corporation counsel, to draw an ordinance providing for a $3,400,000 bond issue. This will finance the building of the railway extension and dam.

When the dam is completed, the second power house will be installed at the canyon and two additional generators put in the Gorge Creek plant, now housing but two. Six months will be required to complete the railway, when work will start on the dam. J. D. Ross, superintendent of the light department, and J. D. Blackwell, city engineer, are preparing the plans for the dam. Mr. Ross recently announced after drillings to determine the quality of foundation rock beneath the river's bed at the canyon had been made that a perfect granite bed was found. At its narrowest point, the conyon is only 30 ft. wide. The bonds to finance the development will be utlity revenue bonds against the earnings of the light department.

Construction of the second unit of the Skagit River hydroelectric project, by the city of Seattle, was brought nearer by the Seattle Board of Public Works on Sept. 20 when that body accepted plans for a dam at Diablo Canyon and issued a call for bids for the construction of a railroad 4¼ miles long from Gorge Creek to Diablo Canyon, the improvement to cost, it is estimated, $3,400,000.

Plans for the project prepared by F. R. Nicholas, special Skagit engineer, working under the direction of J. D. Ross, superintendent of Seattle's municipal lighting department, provide for the 4¼-mile railroad, 1,500 ft. of inclined railroad, diamond drilling for a dam site, rip rapping and dam.

Following the completion of this work, a power plant will be built at Diablo Canyon and bids taken for furnishing two 37,500 hp. turbines, complete with transformers and switching equipment. The plant and equipment which will develop 75,000 hp., will cost $2,689,500. The total cost, including railroad, dam and equipment, is placed at $6,089,500, or a fraction in excess of $80 per horsepower.

Bids for the construction of the railroad will be opened by the board of public works at 10 a.m., Oct. 8, and an award of contract, it is said, will be made immediately thereafter. The existing railroad, extending from Rockport to the Gorge Creek plant is 22 miles long.

The machinery installation of the proposed second unit will not be made for nearly a year, Mr. Ross states. However, specifications for the apparatus needed will be written after the first of the new year.

The new dam at Diablo Canyon will afford 100,000 acre-ft. of stabilized water storage space.

P. O. Crawford Named Copco Manager Succeeding McKee

Perry O. Crawford, who has been connected with the California Oregon Power Company since 1916, was recently elected vice-president and general manager of the company to succeed Paul B. McKee, who has resigned. Mr. Crawford has been vice-president and chief engineer of the company for the past three years.

Mr. Crawford received his technical training at Stanford University, in 1908 receiving an A.B. in electrical engineering. He was then connected with the Northern California Power Company as construction engineer, building several power plants for that company.

A colorful chapter in Mr. Crawford's career came when he left the United States in 1912 to assume duties as assistant engineer on government hydroelectric projects in Afghanistan. For three years he was in charge of the construction of the Jabl-us-siraj power plant.

Upon his return to the United States Mr. Crawford spent six months in research work under Dr. Harris J. Ryan at Stanford University, after which he became connected with the California Oregon Power Company.

Mr. McKee, who resigned from the vice-presidency and general managership of the company, has been connected with the company since 1914. From assistant to the president Mr. McKee was made vice-president and general manager in 1919. Mr. McKee has announced no plans, stating merely that he had opened offices at 454 California Street, San Francisco, and will make announcement later.

Los Angeles Bond Issues Carry by Large Majority

At a recent special election Los Angeles voters approved by a large majority the issuance of $21,000,000 for water and power facilities. (Journal of Electricity, Aug. 1, 1926, p. 104.)

Of the total amount, $11,000,000 is to be used by the city's power department to carry out three major expension programs. These cover:

1. Development of 28,000 hp. additional hydroelectric energy along the Owens River aqueduct.
2. Acquisition of rights-of-way and the construction of tower lines and two new electric stations as a part of a high-voltage transmission system which ultimately will encircle the city.
3. Purchase of privately owned electric distribution lines in recently annexed districts.

Puget Sound Power Company Farm Booklet Makes Strong Appeal

With remarkable forcefulness the idea that "electricity will do for agriculture what it has done for industry" has been brought out in the booklet entitled, "How to Make More Money on the Farm," issued by the argricultural extension service of the Puget Sound Power & Light Company, Seattle. The booklet, 6 x 9 in., has an attractive front cover which, besides carrying the title and sub-title quoted above, has a picture in three colors symbolical of electrical agriculture. Within are twenty-odd pages of terse, practical suggestions for the profitable utilization of electricity for light, heat and power in farming operations and in the farm home, together with drawings and specifications for the construction of newly developed equipment for the poultryman.

The basic idea of the book as announced on the cover is explained on the first inside page in a series of short paragraphs, in which it is brought out that "American industrial workers (through the application of electrically driven machinery to manufacturing) accomplish more, work shorter hours, receive more pay, save more money and enjoy more of the good things of life than the laboring people of any other country," and that "For agriculture to be as prosperous as industry in America, the farmer should benefit by industrial example and employ machinery and electric power to do the farm work wherever possible."

Following this are several pages of suggested uses in which the story is dramatized through the media of pencil sketches contrasting old methods involving drudgery with modern methods employing electricity. Very little written matter is used in these pages, the message being conveyed by the cleverness of the artist in depicting, for instance, the misery of the man facing a pile of wood with a buck saw as against the apparent happiness of him who has belted a utility motor to a circular saw. Other applications are suggested under such headings as: portable farm motor, water for irrigation and domestic use, better lighting in a cow barn and chicken house, light, heat, power, in dairying, as well as the many uses in the home to bring comfort and leisure to the farmer's wife.

The latter part of the booklet is devoted to drawings of new devices and explanations thereof. These are the Shoup electric oat sprouter, designed by George R. Shoup, poltryman, Western Washington Experiment Station, Puyallup, Wash.; the electric underheat brooder, developed by Mr. Shoup and George E. Quinan, chief electrical engineer, Puget Sound Power & Light company, Seattle; and the electric hotbed, explained by F. W. Griffith, owner Puyallup Nursery.

The agricultural extension service of the Puget Sound Power & Light Company is headed by J. C. Scott, agricultural engineer, and is an activity of the commercial department under H. J. Gille, general sales manager. The service has given considerable impetus to the profitable extension of rural lines principally in the western Washington territory of the company, where it is estimated that the company will build this year 600 miles of rural distribution lines to serve approximately 5,400 new customers outside the corporate limit of towns.

California Sells Dam Site for Power Development Project

Deed conveying title to 560 acres of a state-owned dam site just east of Folsom Prison in California to the American River Hydro-Electric Company has been signed and delivered to the state treasurer to be held in escrow until the company completes its power and irrigation project, estimated to cost $7,000,000.

The contract, prepared by the state board of control and approved by the state board of prison directors, provides for the sale of the land under certain conditions to the company for $150,000 cash and a guarantee to supply the prison with water and power in perpetuity. It also requires the company to start work on the dam site 90 days after the approval of the construction plans, which must be submitted to the director of public works within nine months.

Modesto Standby Contract Passed Over S. F. Mayor's Veto

Developments during the past fortnight in the campaign to have the city of San Francisco furnish the Modesto Irrigation District with standby electric service from its Hetch Hetchy project included the veto by the mayor of the ordinance making such a contract and its subsequent passage over the veto by the board of supervisors. The contract provides that the city shall furnish Modesto standby service to the extent of 3,000 kw. for an annual charge of $4,300 and a kw-hr. charge of 4.7 mills. (Journal of Electricity, Sept. 15, 1926, p. 216.)

In his reasons for the veto San Francisco's mayor took the same stand as City Engineer M. M. O'Shaughnessy, namely that the contract price failed to reimburse the city for the cost of service. He also pointed out that the loss to the city would be between $39,000 and $90,000 annually. The mayor further held that no expert advice had been received either as to the actual cost of standby service or to refute the statements of the city engineer.

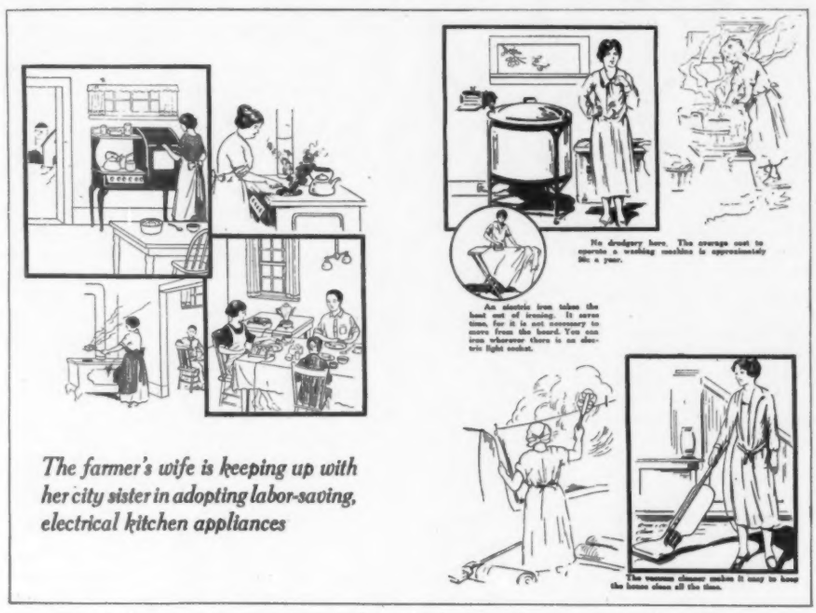
In passing the ordinance ratifying the contract over the veto an amendment calling for the securing of outside engineering advice was voted down by the supedvisors.

As this is written there is a possibility that a taxpayer's suit will be instituted against the supervisors to test the legality of the contract.

New Big Creek Unit Penstock Contracts Let by Edison

Contracts for penstock pipe for the No. 2-A power plant of the Southern California Edison Company's Big Creek-San Joaquin River project have been let. An order for 2,000 tons of banded pipe, 66 in. in diameter by 2½ in. in equivalent thickness has been placed with the Ferrum Company of Poland. An order for 2,000 tons of seamless forged pipe 66 in. in diameter by 3 in. thick has been divided equally between the Midvale Iron & Steel Company and the Bethlehem Steel Company.

In the construction of this penstock which is to be more than a mile in length, forged bends and expansion joints are to be used instead of the ordinary cast or rivited bends or joints. The Kellogg Company is furnishing these fittings. Another unique feature of this installation is the fact that a single line of penstock is to carry the water down the 2,400-ft. drop to the power house where it divides and supplies the two 56,000-hp. units.



The farmer's wife is keeping up with her city sister in adopting labor-saving, electrical kitchen appliances

A sample of the type of illustration used in the booklet "How to Make More Money on the Farm," issued by the agricultural extension service of the Puget Sound Power & Light Company, Seattle. The clever pictures contrasting the old way of doing with the new way of using electrical labor-saving devices make words practically unnecessary.

Aylesworth Leaves N.E.L.A. to Head Broadcasting Company

M. H. Aylesworth, managing director of the National Electric Light Association for a number of years, resigned from that organization recently, it was announced, to become president of the National Broadcasting Company, Inc., formed by the Radio Corporation of America to handle a national program of radio broadcasting. The formation of the new company was announced by Owen D. Young and General James G. Harbord, chairman of the board and president, respectively, of the Radio Corporation of America.

The new company has announced the purchase of the station WEAF from the American Telephone & Telegraph Company for $1,000,000, which it hopes to make a nucleus of national broadcasting service. Control of the station will be assumed by the new station on Nov. 15 and it is said that the company may lease time from other stations.

In his statement following the selection of Mr. Aylesworth to head the new organization Mr. Young said:

"We have been particularly fortunate in getting Mr. Aylesworth to accept the presidency of the National Broadcasting Company, Inc., and in persuading the N.E.L.A. to let him give up the important work that he has been performing with such signal success for the electrical industry."

Mr. Aylesworth was born in Iowa in 1886, was educated as a lawyer, and at the age of 28 became chairman of the Colorado Public Utilities Commission. He gave up public office to join the Utah Power & Light Company in 1918. Shortly afterward he was named managing director of the National Electric Light Association, taking office the year of the convention at Pasadena, Calif. Mr. Aylesworth has many staunch friends and supporters in the West.

Foshay Interests Open Security Sales Office in Portland

In connection with expansion program of the W. B. Foshay Company whereby security sales offices are being opened in Portland, Ore., San Francisco, Denver and Boston in addition to the present offices in Minneapolis, St. Paul, New York and Chicago, there is the announcement of the appointment of C. H. Burnworth as sales manager of the security sales offices in Portland. Mr. Burnworth was formerly with the Lumbermen's Trust Company, Portland, Ore. He is well known as an investment expert and has a large cilentele on the Pacific Coast.

The Portland, Ore., San Francisco, Denver and Boston offices are being established to provide for sales directly to investors of securities issued or underwritten by the W. B. Foshay Company.

San Joaquin Company Installs Four Large Transformers

The increasing demand for electrical service in the coast country served by the Midland Counties Public Service Corporation, a subsidiary of the San Joaquin Light & Power Corporation, Fresno, Calif., has resulted in the installation of four large transformers in the Santa Maria substation.

The Santa Maria substation, the terminus of the McKittrick - Santa Maria 110-kv. transmission line, is the largest on the Midland Counties system as are the newly installed transformers. They have a capacity of 7,500 kva., with voltage ratings of 110/72.76/12.5 kv. Ten years ago three transformers with a capacity of 600 kva. handled all the requirements of the Santa Maria district. The new transformers are 20 ft. 4 in. high, 10 ft. 4 in. wide and weigh 36½ tons completely assembled. Specially designed flat cars were necessary in transporting them across the country, and they stood so high that the shipment was routed over eight railroads to avoid tunnels or bridges that would not permit them to pass. Normally three railroads would have been used.

The transformers were placed in service July 11, giving the substation a capacity of about 30,000 hp.

Democrats Re-nominate Hunt for Arizona Governorship

Governor George W. P. Hunt, ardent advocate of Arizona's rights on the Colorado River, was re-nominated for the sixth time by the Democratic party at the Arizona state primaries. E. S. Clark, attorney of Phoenix, received the Republican nomination.

In a statement issued following the election Governor Hunt reiterated the stand he had previously taken with regard to the development of the Colorado. Among other things, he promised that "this birthdright (the power and irrigation potentialities of the Colorado River) shall never be bartered to private corporations." His statement included opposition to the Swing-Johnson bill and the present Colorado River Compact. He also stated that it was his plan to ask the legislature for funds to carry Arizona's fight over its rights on the river to the United States Supreme Court.

The statement of Mr. Clark charges the present muddle with reference to the Colorado to the Democrats and urges immediate development of the river as soon as a satisfactory agreement can be reached between the Colorado Basin states.

Pacific Company Reduces Rates in Washington

Effecting a saving estimated at $150,000 annually to its customers on the Yakima-Walla Walla system in the state of Washington, the Pacific Power & Light Company, Portland, has reduced rates on nearly all lighting and power schedules effective Aug. 1. New tariffs were filed reducing residential lighting, combined residential lighting and cooking, commercial lighting, and general power schedules in all towns served by the company to rates comparable with those of towns served by other companies in the surrounding territory.

The reduction was voluntary and was made possible by reason of increased business in the past year combined with improvements in operation producing a saving in operating expenses. The reduction has no bearing on the valuation case in which the company's rate base was contested by the combined cities and towns served by the company in Washington and which is still before the supreme court of the state.

Many Attend San Francisco's I.E.S. Lighting School

With an enrollment of 45, the five-day lighting school conducted under the auspices of the Illuminating Engineering Society, San Francisco bay cities chapter, completed its course Sept. 25 and elicited requests for further such courses in the future. The school was conducted under the direction of Clark Baker, National Lamp Works, and president of the chapter.

In the enrollment were represented men from contracting companies, jobbing establishments and from the sales forces of the power companies. A quota was assigned to each branch of the industry and practically filled as to classifications. The course was detsigned by Clark Baker and his associates to present a simple working knowledge of illumination, free from technical or complicated theory.

The course as laid out took up, the first night, terms, definitions and fundamentals of illumination with demonstrations of light control and diffusion. The next meeting, an afternoon session, took up industrial lighting. The third class, the next evening, considered home and store illumination. The fourth class, and afternoon class, brought up diversified cases of special lighting, while the last class, in the evening, took up office lighting and reviewed the course.

Instructors in the course besides Clark Baker were Robert Prussia, Westinghouse Lamp Company; Carl Martin, Benjamin Electric & Manufacturing Company; and Tracy Simpson, Electrical Products Corporation. The classes were held in the Pacific Gas and Electric Company's third floor sales meeting room, at 447 Sutter Street. A $10 guarantee was returned to all enrolled who attended every class.

Savage Arms to Manufacture Electric Refrigerators

The Savage Arms Corporation recently announced the appointment of Frank B. Ruoff to the position of sales manager of its newly created electric refrigeration division.

Mr. Ruoff for the past two and a half years has been sales manager of the Eastern sales division of the Nizer Corporation. His studies of the problems confronting ice cream manufacture in connection with the adoption of the iceless cabinet to their business are said to fit him for his new position with the expanding Savage organization.

Test Borings to Be Made on Proposed Site for Wynooche Project.—Proposed development of the Wynooche power project by the city of Aberdeen was advanced one step when the city officials of Montesano gave permission to allow test borings on the proposed site of the power and water system, and a price of $50,000 for the dam site, and $10 an acre for bottom land was confirmed by Mark Reed, who owns the site. Three sites are now under consideration, and the most favorable location will be the one purchased. It is expected that approximately 700 acres will be flooded in the purchase. J. L. Stannard is consulting engineer for the joint water and hydroelectric project.

News Briefs

Utah Town Contemplates Installation of "Whiteway" Lighting.—The town of Beaver, Utah, is contemplating the installation of a new "whiteway" lighting system in the near future. The new system will extend for five blocks in the business district.

Seattle Acquires Half Block Additional Area for Substation and Depart Store Building.—The city of Seattle has acquired a half block site on the northwest corner of Third Avenue and Madison Street that will be used as additional area for its electric light department's substation and department store building.

League Endorses Swing-Johnson Bill.—The California League of Municipalities at its recent session in Yosemite Park unanimously adopted a resolution endorsing the Swing-Johnson Bill which provides for the construction of the Boulder Canyon dam across the Colorado River. The resolution described the bill as "the most constructive internal improvement measure now pending before Congress."

New Hearing on Big Springs Electric Company Rate.—Investigation into the basis for increased rates petitioned for recently by the Big Springs Electric Company serving a number of towns in San Pete County, Utah, has been started in the form of a new hearing on the subject. The basis of depreciation allowed by the Public Utilities Commission in a former ruling was attacked by attorneys for some of the company's patrons, who asked that it be reduced, as much of the property already had been depreciated very largely.

Cushman Spillway Contract Let.—Contract for the construction of the spillway for the Cushman power project basin, under development by the city of Tacoma, Wash., the last major feature of the project remaining to be built, has been let to Albertson, Cornell Brothers and Walsh., Tacoma, for $78,191.50, although two bids were lower. The firm has agreed to complete the contract in 100 days. The spillway of the Cushman basins will be built about a quarter of a mile from the dam at the lowest point in the reservoir rim.

Yosemite Power Company Proposes $5,500,000 Power Project.—Applications for permission to develop a hydroelectric project, the total cost of which will be more than $5,500,000, has been received by the California division of water rights from the Yosemite Power Company. H. A. Kluegel, San Francisco, has applied on behalf of the company for 175 sec.-ft. and 65,000 acre-ft. per annum from the South and Middle Forks of the Tuolumne River tributary to the Tuolumne River to be diverted for power purposes in three power houses. Total horsepower to be developed by this project is expected to be 66,304.

California Electric Light and Power Companies' Consumers Increase.—Electric light and power companies report 1,160,384 consumers in 1925, as against 1,063,169 in 1924, an increase of 97,215, according to the California Railroad Commission.

City of Tacoma Awards Contract for Electric Cable.—The city of Tacoma, Wash., has awarded a contract for furnishing electric cable for the Commerce Street underground power installation to the General Electric Company on its bid of $59,177.83.

Great Western Power Company Applies for License.—The Great Western Power Company of San Francisco has applied to the Federal Power Commission for a license covering thirty-eight miles of 220-kv. transmission line between Caribou Point and its Big Bend plant.

Franchise Granted Puget Sound Company in Lewis County.—The Lewis County commissioners at Chehalis, Wash., have granted a 25-year franchise to the Puget Sound Power & Light Company for use of right-of-way on the Clinton and White roads in the Adna district.

Power Project Planned for Merced River in California.—A proposed hydroelectric power project to develop 13,750 hp. is revealed by the filing with the California Division of Water Rights of an application for permission to divert 2,000 sec.-ft. of water from the Merced River in Mariposa County, Calif. Plans include construction of a dam 80 ft. high, 1,000 ft. long at the crest and 200 ft. at the base. The application was filed by Daniel McFarland of Storrie, and the estimated cost is set at $400,000.

Pasadena, Calif., Seeking Bids on Natural Gas Supply for Generation of Electricity.—Bids are being sought by the city of Pasadena, Calif., for a natural gas supply to generate electricity at the municipal light and power department plant. Under the present contract which the city has with the Los Angeles Gas and Electric Corporation Pasadena enjoys a rate of 19 cents per 1,000 cu.ft. of gas. This, according to B. F. Delanty, general manager of the Municipal Light and Power Department, is equal to oil at $1 per bbl. Mr. Delanty states that the city is using approximately 2,500,000 cu.ft. of gas a month, the supply coming from the Ventura field.

Recent Applications Filed with California Division of Water Rights.—Two applications recently filed with the California Division of Water Rights cover two proposed power projects. One was made by C. S. Wheeler, Wheelerville via Reno, Nev., for 500 sec.-ft. of water from the Truckee River tributary to Pyramid Lake to be diverted for power and domestic purposes, with a development of 11,023 hp. The other was filed by the Pacific Gas and Electric Company which has applied for 9,412 acre-ft. per annum from Deer Creek tributary to the North Fork of the Mokelumne River for power purposes. The estimated cost is set at $600,000 and 14,170 hp. is to be developed.

Kennedy Mine Installs Electric Motor.—The Kennedy Mine on the Mother Lode has installed a 7501hp. motor for operation of its equipment at Jackson, Calif., according to press dispatches. Wood is becoming too scarce for profitable firing for steam power and sufficient coal is not available. Previous to the installation the machinery was operated by steam power.

P.C.E.A. News

Transportation Section to Hold Meeting Oct. 4-5

The Transportation Section of the Pacific Coast Electrical Association will hold its first meeting in Los Angeles Oct. 4-5 at the office of P. H. Ducker, 1515 East First Street.

In addition to laying out the program for the administrative year, there will be an informal discussion of the various subjects relating to the operation and maintenance of automotive equipment in which section members are interested, some of which will be:

1. Records and Accounting Practice.
2. Lubrication, including air filters, oil filters, etc.
3. Motor vehicle design and construction.
4. Economic life and replacement of motor vehicles.
5. Body construction and design.
6. Automotive repair, public tools and equipment.
7. Painting methods.
8. Power operated labor saving devices.

Purchasing and Stores Section Decides on Organization

Determination to make meetings of that section two-day affairs, the first for discussion of business, the second to visit plants and storage facilities, as well as organization of the section for the year's work, marked the features of the first meeting of the Purchasing and Stores Section, at the Edison Building, Los Angeles, Aug. 26. C. D. Weiss, San Diego Consolidated Gas & Electric Company, chairman of the section, presided. Mr. Weiss' report of the meeting and work accomplished is as follows:

General discussion of subjects for the year's work resulted in the following:

Purchasing Policies.—C. R. Eccles, chairman; J. H. Hunt, T. B. Parks, J. L. Gray.

Material Control.—H. O. McKee, chairman; C. A. Kelley, W. deWaard.

Stores Department.—Building, facilities, and material handling devices, William Maddock, chairman; D. P. Mason, H. O. McKee.

Surplus Materials.—F. W. Smith, chairman; C. R. Eccles, G. C. Robb, R. E. Thompson.

Obsolesence and Reclamation.—C. B. Lore, chairman; F. R. Sherwood, T. B. Parks.

Inventories—W. deWaard, chairman; Wm. Maddock, I. B. Walther.

Stores Organization.—F. F. Henry, chairman; I. B. Walther, S. E. Hickman, R. E. Thompson.

Standardization and Simmplification Stores Stocks.—W. J. McCullough, chairman; C. A. Kelly, D. P. Mason.

Stanlard Methods Securing Executive Action on Year's Work.—C. D. Weiss, chairman; C. A. Kelley, H. O. McKee, F. W. Smith, C. R. Eccles.

Analysis of subjects for papers and discussion:

Purchasing Policies.—To cover the ethics of purchasing, organization, etc.

Material Control.—Control of purchasing, keeping stocks down; ordering.

Surplus Materials.—Surplus materials in hands of the different companies represented within the committee to be circularized and arrangements made to publish in the Journal of Electricity as for sale—along similar lines to the publication of anticipated purchases in the California Commercial Digest.

Inventoriees.—To be a review of the committee's report for 1924-1925 and the addition of new developments.

Stores Organization.—Review of previous reports of the committee, and the addition of personnel to be covered with a view of enhancing stores workers, securing proper rates of pay that will permit holding of men, rather than have them transfer to other departments, etc.

Standardization and Simplification of Stocks.—To include stores ideas on specifications for paint—standard colors; contracting for one or more years with a firm quoting satisfactory prices and material on specifications adopted.

Standard Metthods Securing Executive Action on Year's Work.—Method for the different companies represented to secure executive action on the work of the committee; executive encouragement, and means for the distribution of the work of the committee to those interested, not only in purchasing and stores departments, but particularly those departments ordering materials.

It was the understanding of the meeting that the committees handling these subjects would review previous reports of the Section—in other words bringing up to date those subjects worthy of consideration each year.

Each sub-committee chairman is to be responsible for securing papers from all members of his committee, and will forward to C. D. Weiss, chairman of the Purchasing and Stores Section, by Nov. 1, 1926, twenty-five copies of each paper, for distribution to all members of the Purchasing and Stores Section on or before Nov. 10, 1926. This arrangement will give each member of the Section an opportunity to study the papers before the next meeting. The use of plain paper and standard outline adopted by the Section was urged.

It was decided that at future meetings a committee on arrangements would be appointed to take care of the entertainment of the members attending meetings, such as visiting factories of products in which they are interested, storerooms, warehouses, etc.

It was decided that meetings shall cover two days, the first day for the discussion of business, and the second for visiting plants, etc.

It was agreed to appoint a permanent secretary for the Section in order that the minutes of all meetings may be available for the use of the Section when in session, the term of office to cover the year's work, and with the appointment of a new secretary all records are to be transferred to the new Section.

The work of the surplus material committee was discussed at great length and it was agreed that lists of surplus material would be obtained from member companies, copies forwarded to all members of our Section, and a copy sent to the Journal of Electricity for publication. The next meeting of the Section is to be held in San Francisco Thursday and Friday, Dec. 2-3, 1926.

The Section extended W. J. McCollough a vote of thanks for providing the meeting place and furnishing a very able stenographer.

Northwest Electric Light & Power Association

Further Personnel Appointments Are Announced

Announcing the completion of the rural electric service committee, its chairman, L. A. McArthur, vice-president and general manager, Pacific Power & Light Company, Portland, has announced that a meeting will be held shortly to outline the work for the year. One of the functions of this special committee of the Northwest Electric Light and Power Association is to give every aid to the research work carried on by the state committees on the relation of electricity to agriculture.

The personnel of the committee is as follows: Vice-chairman—George T. Bragg, Pacific Power & Light Company, Portland; H. C. Wells, engineer, Mountain States Power Company, Albany, Ore.; L. R. Sheeley, superintendent, Deschutes Power & Light Company, Bend, Ore.; F. J. Farquhar, general agent, The Washington Water Power Company, Spokane; A. C. McMicken, sales manager, Portland Electric Power Company, Portland; L. R. Grant, assistant sales manager, Central District, Puget Sound Power & Light Company, Seattle; and J. C. Thompson, California Oregon Power Company, Medford, Ore.

P. M. Parry, chairman of the public relations committee for Utah, has appointed the following members of his committee:

H. B. Waters, general manager, Telluride Power Company, Salt Lake City; C. A. Wolfrom, division manager, Utah Power & Light Company, Provo; and A. L. Woodhouse, general manager, Dixie Power Company, St. George.

Members at large of the executive committee of the Engineering Section have been appointed as follows:

J. B. Brokaw, Eastern Oregon Light & Power Company, Baker, Ore.; J. A. Hale, Utah Power & Light Company, Salt Lake City; W. S. Hill, Grays Harbor Railway & Light Company, Aberdeen, Wash.; H. H. Schoolfield, Pacific Power & Light Company, Portland.

N.E.L.A. Engineering Section to Meet in Chicago Oct. 13-15

The first group meeting of the Engineering Section, N.E.L.A., will be held in Chicago, Oct. 13-15 at the Edgewater Beach Hotel.

The P.C.E.A. Engineering Section will be represented by seven men, thus maintaining the inter-group co-operation that has proved so valuable. Those who will attend are J. G. Rollow, chairman of the section; J. M. Gaylord, M. S. Slaughter, A. J. Hall, I. J. Corbett, C. E. Young and E J. Crawford.

Two Convention Chairmen Appointed.—President D. C. Green has appointed P. M. Parry, Utah Power & Light Company, chairman of the convention program committee, and J. A. Kahn, president of the Capital Electric Company of Salt Lake City, chairman of the convention entertainment committee.

Women's Committee to Meet Soon to Plan Active Year

The women's committee of the Public Relations Section will be headed this year by Marguerite Butler, director of women's activities, Portland Electric Power Company, Portland, according to announcement by R. M. Boykin, manager central district, Puget Sound Power & Light Company, Seattle, chairman of the Section. Before outlining plans for the year Miss Butler will attend a meeting of the National Women's Committee in Chicago Oct. 4 so that activities in the Northwest division may be made to tie in as far as is practicable with the national program. A meeting of the Northwest committee is scheduled tentatively for Oct. 18 at Portland, when prospective work will be discussed.

The personnel of Miss Butler's committee, in so far as it has been confirmed to date, is as follows: Mrs. Nell Laws, Puget Sound Power & Light Company, Seattle; Stella Dorgan, Mountain States Power Company, Albany, Ore.; Mrs. A. W. Angell, Northwestern Electric Company, Portland; Mrs. E. A. Moyle, Utah Power & Light Company, Salt Lake; Mrs. Gertrude McDevitt, Idaho Power Company, Boise; Mary K. Walsh, The Washington Water Power Company, Spokane; Ellen McCurdy, Pacific Power & Light Company, Walla Walla, Wash.; Esther Miller, Gray's Harbor Railway & Light Company, Aberdeen, Wash.; Anna Gyllenberg, Eastern Oregon Light & Power Company, Baker, Ore.; Martha O. Goldapp, General Electric Company, Portland, and Edna Comstock, Oregon Public Utility Information Bureau, Portland. Additional appointments may be announced later.

Utah Public Relations Committee Formed.—Appointment of the public relations committee for Utah fo the Northwest Electric Light and Power Association, by P. M. Parry, commercial manager, Utah Power & Light Company, Salt Lake, vice-president for Utah, has been announced as follows: E. R. Owen, Utah Power & Light Company, Logan; H. B. Waters, Telluride Power Company, Salt Lake; C. A. Wolfrom, Utah Power & Light Company, Provo; and A. L. Woodhouse, Dixie Power Company, Celar City.

A.I.E.E. News

H. H. Schoolfield, chief engineer, Pacific Power & Light Company, Portland, and vice-president for District No. 9, A.I.E.E., has appointed J. E. Yates, assistant chief engineer, Pacific Power & Light Company, secretary for that district, which includes the Northwest states. Mr. Yates is also secretary of the Portland Section.

News of the Electragists

Colorado League Makes Budget for Red Seal Promotion

The advisory board of the Electrical League of Colorado has approved a budget calling for the expenditure of $750 during the next three months in a Red Seal educational campaign directed towards architects, builders and electrical contractors, according to E. A. Scott, chairman of the league's' Red Seal committee.

This appropriation will be used in the purchase of display space in local trade publications and likewise for a direct mail campaign in an effort to further acquaint the building industry with the Red Seal movement. In addition, classes of instruction will be held for electrical contractors and their journeymen, it being the thought of the league's advisory board that the industry must be ready to function intelligently prior to the launching of an intensive newspaper advertising campaign for the coming spring building activity.

Aberdeen Adopts New Electrical Code Ordinance

The city of Aberdeen, Wash., has adopted a new electrical code, designed to simplify the installation and inspection of electrical equipment in the city. The ordinance governs the installation and regulation of electric wiring, apparatus and appliances, fixes charges for issuing permits for installation of electric fixtures, provides penalties for violation of the ordinance, and repeals four previous electrical ordinances.

The office of electrical inspector was created and the chief of the fire department made ex-officio electrical inspector without additional pay. The ordinance consists of 13 articles, and it was drawn after numerous conferences between city officials and electrical men in the city.

F. C. Sherman, proprietor of the **Sherman Electric Company** of Corning, Calif., was a recent visitor to San Francisco. He paid a visit to old friends when he attended the regular meeting of the San Francisco Electrical Contractors and Dealers Association.

F. W. Buzzell, of the **Buzzell Electric Works,** San Francisco, recently announced that he had acquired the agency for the Howell line of Red Band motors, as well as the Peerless line of single phase motors, in the bay territory.

Northwest Inspectors Will Meet in Portland Instead of Longview.—The second annual convention of the Northwest Association of Electrical Inspectors will be held at the Multnomah Hotel, Portland, Jan. 18-19, 1927, instead of at Longview, Wash., as originally planned. Manufacturers will be invited to present exhibits at the hotel during the two-day convention.

James H. Paige, formerly superintendent for **W. E. Langstaff** of Pasadena, has purchased the interest of **E. J. Field** in the **Field Electrical Company,** 361 E. Street, San Bernardino, and is operating it as the **Paige Electric Company.**

Fred Elser, Los Angeles electragist, who can be counted on to be present at all conventions of the organization.

D. L. Hofer has opened an electrical shop under the name of **Hofer's Electric Shop,** at 405 Fifth Street, Marysville, Calif. Mr. Hofer was formerly connected with the **Yuba Maufacturing Company** and the **Hammon Engineering Company,** having installed a 3,000-hp. Diesel electric plant in Nome, Alaska, for these companies and operated it for three years. He also installed similar projects in South America. His present shop is an electric shop, specializing in motor winding and electrical contracting.

Want Manufacturers Displays at Northwest Inspectors Meeting

The Northwest Association of Electrical Inspectors, for its next annual convention, is desirous of displaying in connection with the meetings a number of exhibits at the hotel in which the convention is to be held. An invitation has been extended to all manufacturers to secure space in these exhibit quarters for that meeting, according to F. D. Weber, secretary.

Those desiring space are directed to write to the secretary for information regarding the plan. Something of the nature of display held at Cedar Point for the A. I. E. convention is being planned.

E. C. Headrick, executive committeeman from the mountain division, A.E.I., attended the Electragists convention at Cedar Point, Ohio, Aug. 23-27 as the Denver delegate. Mr. Headrick is prominent in contractor association activities in the mountain region. While East he continued on to Association Island, as representative of the Electrical League of Colorado to the National Electrical League Council, Aug. 30-31, and the meetings at Camp Cooperation VI, Sept. 1-4.

Richard McHugh, Inc., Okanogan, Wash., has the contract to install two 200-hp. pumping-plant units and an auxiliary 15-hp. unit to pump water from the Okanogan River onto the lands of Progressive Flat. The installation will provide auxiliary supply of water for 700 acres of land.

W. B. Holland of the **Holland Electric Company,** 177 West Center Street, Anaheim, Calif., has remodeled his store so as to double the floor space. Mr. Holland wanted to have a better display of appliance fixtures. The company also does wiring and motor work.

Fred Anderson who, with **H. Schfeld,** has been operating the **Pleasanton Elecrtic Company,** Pleasanton, Calif., as a contractor-dealer establishment, recently bought out Mr. Schfeld's interest in the business.

J. J. Farley (left) and Lee C. Baltzelle of the J. J. Farley Electric Company. Mr. Farley has been a member of the executive committee of the Southern Division of the California Electragists, and Mr. Baltzelle has been active in conducting classes in the electragist system of estimating for the members.

Meetings

Officers and Directors Elected by Seattle Electric Club

Newly elected officers of the Electric Club of Seattle installed in office Aug. 23 include J. D. Ross, superintendent of Seattle's Municipal Lighting Department, president; R. M. Boykin, general manager, Seattle district, Puget Sound Power & Light Company, vice-president; A. J. Lutz, manager, Pacific States Electric Company, Seattle, second vice-president; D. U. Chamberlin, president of the Globe Electric Company, treasurer, and P. L. Hoadley, representing Stanley & Patterson, Seattle district, executive secretary.

Directors were named as follows: J. J. Hayes, treasurer of the Westinghouse Electric & Manufacturing Company; J. J. Agutter, of the J. J. Agutter Company; J. Harisberger, electrical engineer, Puget Sound Power & Light Company, and Glen Smith, electrical engineer, Seattle Municipal Lighting Department. C. A. ("Joe") Osier has been retained as editor of R.P.M., the Electric Club's official organ, published monthly, and Harry J. Martin, of the National Carbon Company, will retain his position as business manager.

Former officers and directors of the Electric Club included T. S. Wood, repsecenting the Packard Electric Company, president; D. U. Chamberlin, treasurer, and P. L. Hoadley, secretary. The office of first vice-president held by Tom Wood, who succeeded David M. Roderick as president, was not filled. Mr. Roderick resigned last spring to accept a position in New York City as manager for W. P. Fuller & Company. The former directors were Grover C. Burke, City Electric & Fixture Company; A. E. Griswold, A-G Manufacturing Company; R. E. Thatcher, Puget Sound Power & Light Company; George T. Thirsk, electrical engineer; J. R. Wells, Fobes Supply Company, and W. M. Meacham, of Meacham & Babcock, electrical contractors.

Although no definite plans have been developed, the Electric Club is considering an electrical exposition to be held this year under the guidance of the new officers and directors.

Los Angeles Electric Club Starts Third Bowling Tournament

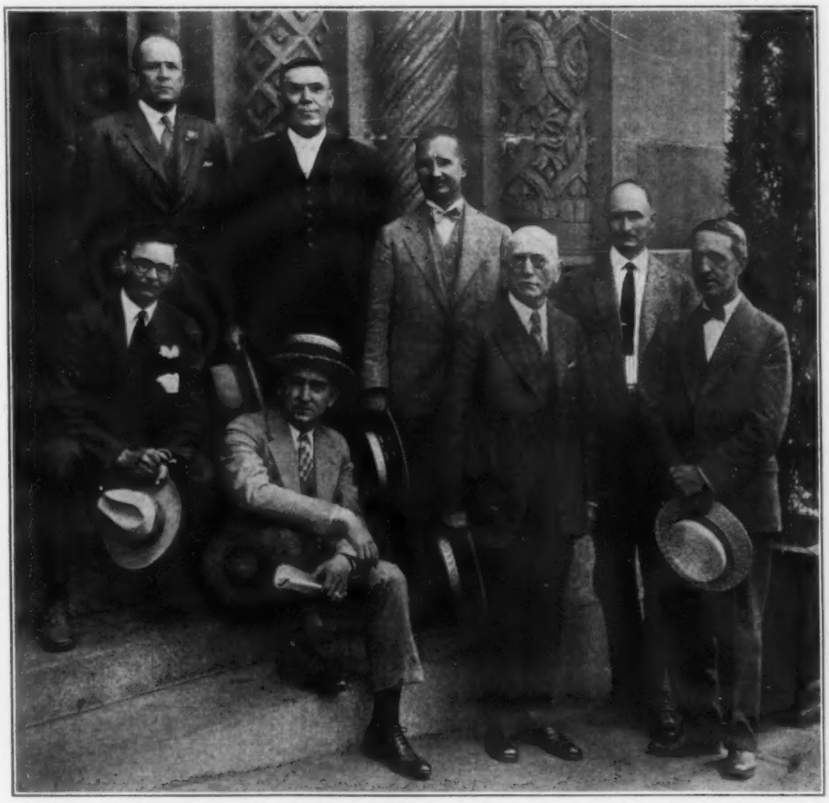
With a league composed of 28 teams, each representing an electrical company of Los Angeles, the third bowling tournament of the Los Angeles Electric Club started Sept. 29 at Bimini Bowling Bowl. J. A. Sines, Chicago Fuse Manufacturing Company, chairman of the sports committee of the club, is acting as director of the league.

This year's tournament will be larger than that of the past two seasons by several teams. Last year 24 teams competed, while the first year only 10 teams played the tournament, indicating a growing interest in the sport.

Represented this year are teams, grouped in two division of 14 teams each, from the following:

First Division: H. H. Walker Electric Company, Western Light & Fixture Company, Reiman Wholesale Electric Company, Graham Reynolds Electric Company, The Electric Corporation, Brown & Pengilly, Westinghouse Electric & Manufacturing Company, L. A. Railway Company, Manufacturers Agents No. 1, Golden State Electric Company, Los Angeles Department of Electricity, General Electric Company, Electrical Products Corporation, Graybar Electric Company.

Second Division: Pacific States Electric Company, Illinois Electric Company, Safety Electric Products Company, Newbery Electric Corporation, Southern California Edison Company, Los Angeles Gas and Electric Corporation, Los Angeles Department of Water and Power, Southern California Telephone Company, Pacific Electric Railway Company, Manufacturers' Agent No. 2, J. A. Roebling & Sons Company, Llewellyn Iron Works, Kelman Electric Manufacturing Company, Baker Iron Works.



A group of officials of the Seattle Electric Club. Back row, left to right—R. M. Boykin, manager central district, Puget Sound Power & Light Company, vice-president; J. D. Ross, superintendent of the Municipal Lighting Department, president; A. J. Lutz, manager, Pacific States Electric Company, second vice-president; and Glen Smith, electrical engineer, Municipal Lighting Department, director, all chosen at the club's recent election. Front row—T. S. Wood, representing the Packard Electric Company, retiring president; Harry J. Martin, of the National Carbon Company, twice president of the club and former director, who will continue as business manager of R.P.M., the club's official organ; P. L. Hoadley, representative of Stanley & Patterson in the Seattle district, re-elected executive secretary; and D. U. Chamberlin, president of the Globe Electric Company, again made treasurer.

COMING EVENTS

Transportation Section, P.C.E.A.—
Meeting in office of P. H. Ducker, 1515 East First Street, Los Angeles
Oct. 4-5, 1926

Engineering Section, N.E.L.A.—
First Group Meeting, Edgewater Beach Hotel, Chicago
Oct. 13-15, 1926

Purchasing and Stores Section, Pacific Coast Electrical Association—
San Francisco, Dec. 2-3, 1926

Northwest Association of Electrical Inspectors—
Annual Convention—Multnomah Hotel, Portland, Ore.,
Jan. 18-19, 1927

Book Reviews

ELECTRICAL ENGINEERING

By C. V. Christie. New York, McGraw-Hill Book Company, 1925; 613 pages, 6 x 9 in., cloth, third edition, revised and enlarged, illustrated. Price $5 net.

This volume is an advanced college text on the theory and operating characteristics of electric circuits and machinery. The earlier chapters are devoted to the basic theory of the electric and magnetic fields and to the calculation of d.c. and a.c. electric circuits.

The subject of d.c. machinery is considered at length, with an extended discussion of the different types of apparatus, their operation and the details of design. A sample calculation for a 250-kw., 250-volt, 400 r.p.m. d.c. generator is included to illustrate the method of design procedure.

Similar consideration follows for both synchronous and asynchronous a.c. machines, transformers, etc., and final chapters discuss the subjects of high-voltage transmission and electrical measurements.

Many years of practical experience in technical instruction and two thorough revisions of the subject matter have developed this book into a most valuable groundwork for collegiate use, particularly in conjunction with parallel courses of instruction in physics, higher mathematics and electrical laboratory work. R.H.T.

Personals

Joseph A. Fowler, president of the Association of Electragists, International, is the guest of honor at the annual convention of the California Electragists which will be in session from Oct. 1 to Oct. 3 at Del Monte, Calif. Mr. Fowler is well fitted by character and experience for the prominent po-

JOSEPH A. FOWLER

sition he holds. He is known for his ability to bring disagreeing factions together and to secure their best thought and co-operation. He is president of the Fowler Electric Company of Memphis, Tenn., which he has built up to the point where it is the leading electrical contracting establishment in that city. The concern also does a merchandising business so that Mr. Fowler is conversant with the problems of both of those branches of the industry. During his service of more than fourteen years as executive committeeman Mr. Fowler has made a number of important contributions to the industry's thinking and economic advancement. He was instrumental in securing for electrical contracting a separate classification on liability insurance. His address at the Chattanooga convention of the association and his subsequent work as chairman of the liability insurance committee found quick expression in the relief afforded to the industry. From a policy of no set rates or classification, electrical contracting now is recognized as one of the less hazardous of the building trades. While not the originator of the Data Book, Mr. Fowler was largely responsible for its later growth and development. Furthermore he was one of the first to recognize the need for estimating labor data. His early activities in this connection had much to do with starting the chain of thinking that later led to the present manuals of estimating. Mr. Fowler's leadership as president of the Association of Electragists, International, has been marked by the great advances he has brought about in recognition from the other branches of the electrical industry of the important place of the contractor-dealer in the distribution of electrical service to the public.

C. D. Jacobsen, assistant electrical engineer, Byllesby Engineering and Management Corporation, spent some time in San Diego during September in connection with new electrical installations at Stations "B," "C" and "F" of the San Diego Consolidated Gas and Electric Company.

H. Boyd Brydon, mechanical engineer, Byllesby Engineering and Management Corporation, recently made a short visit to San Diego. Mr. Brydon was accompanied by **J. J. Brennan,** test engineer, Northern States Power Company, one of the largest Byllesby properties with headquarters in Minneapolis.

Mrs. M. L. Neves has been appointed chairman of the Western States Gas & Electric Company's Women's Club, Stockton, Calif., succeeding **Miss Anne Garvin,** who has been chairman for the past two years.

S. Waldo Coleman and **Samuel H. Taylor,** president and secretary, respectively, of the Pacific Coast Electrical Association, will leave Oct. 2 to attend the N.E.L.A. executive committee meeting in Chicago Oct. 8.

Roscoe F. Oakes, vice-president and general manager of the National Carbon Company of San Francisco, recently completed a month's trip in the Pacific Northwest, where he did his first salmon-trolling in Puget Sound waters. Mr. Oakes, accompanied by his wife, attended the Pacific Coast Electrical Jobbers convention in Victoria.

J. F. Orr, sales manager, Idaho Power Company, Boise, accompanied by **R. E. Richardson** of New York, recently visited the company's Payette officese.

J. A. Hale, chief engineer, Utah Power & Light Company, Salt Lake City, was a visitor in Boise, Idaho, a short time ago.

Kinsey Robinson, division engineer of the Payette division, Idaho Power Company, spent a few days in Boise not long ago.

R. B. King, general superintendent, and **J. D. Orr,** manager, Payette division, Idaho Power Company, Boise, made a trip to Baker, Ore., and adjacent mining territory recently.

J. W. Crowe, division manager at Boise for the Idaho Power Company, paid a short visit to Payette, Idaho, a short while ago.

A. V. Lagomarsino, tenor and **C. E. Bates,** pianist, of the new business department and bookkeeping department, respectively, of the Los Angeles Gas and Electric Corporation, were among those who took part in the program at a recent meeting of the Los Angeles Electric Club conducted under the auspices of that company.

H. H. Walker, president, California Electragists, **W. L. Frost** of the Southern California Edison Company; **P. H. Booth,** of the Edison Electric Appliance Company, and **Charles Listenwalter,** of Listenwalter & Gough, all of Los Angeles, recently made a trip to San Francisco to attend a meeting of the advisory committee of the California Electrical Bureau. **H. H. Courtright,** of the Valley Electrical Supply Company, Fresno, also was present.

C. E. Heise, district manager, Westinghouse Electric & Manufacturing Company, San Francisco, recently departed on an extensive trip East where he will visit East Pittsburgh and other large centers.

S. R. Inch, vice-president of the Electric Bond & Share Company, and formerly vice-president and general manager of the Utah Power & Light Company, spent a week in Salt Lake City, conferring with Utah Power & Light Company officials, during September.

C. C. Chesney, president of the American Institute of Electrical Enginee, addressed the weekly luncheon of the Salt Lake City Chamber of Commerce on Sept. 8. **B. C. J. Wheatlake,** manager of the Salt Lake City branch of the General Electric Company, presided at the luncheon, which was attended by many delegates to the Pacific Coast convention of the American Institute of Electrical Engineers.

N. H. Callard, Jr., formerly representative of the Westinghouse Electric & Manufacturing Company in Boise, Idaho, has been appointed assistant to **G. H. Frobel,** central station sales manager of that company, with headquarters in New York City.

W. L. Shay, formerly credit manager of the **Myers Electric Company,** Los Angeles, has resigned to become the Los Angeles sales manager of the **Reiman Wholesale Electric Company.**

Newton Graham of the **Graham-Reynolds Electric Company,** and **Harry Harper,** Los Angeles manager of the Graybar Electric Company, attended the Jobbers Association convention at Victoria, B. C., Sept. 7-9.

F. J. Rankin, chief engineer, Idaho Power Company, Boise, for many years active in the affairs of the Northwest Electric Light & Power Association, has been appointed chairman of the

F. J. RANKIN

Engineering Section for the year 1926-7. After being graduated in electrical engineering from the University of Kentucky in the class of 1907, he practiced his profession in a number of ways, among which were chief engineer of the Public Utilities Commission of Colorado for four years and one year in private practice. In the summer of 1919 he went to Boise to enter the engineering department of the Idaho Power Company, and in the fall of 1921 was made chief engineer of that company, a position he has held ever since. He is an active member of the American Institute of Electrical Engineers and of the National Electric Light Association, having been one of the engineer members of the range survey committee of the latter that conducted the tests on ranges in Boise and Spokane, embodied in the final report of that committee at Atlantic City last May.

Major Howard Sharp Bennion, former assistant chief engineer of the Federal Power Commission, has been appointed director of engineering at N.E.L.A. headquarters to succeed Col. William Kelly. Colonel Kelly has resigned his work with the National Electric Light Association to become vice-president of the Buffalo, Niagara & Eastern Power Corporation in charge of engineering and operation. Major Bennion was born at Vernon, Utah, in 1889. He attended grammar and high school at that place and Salt Lake City, entering the U. S. Military Academy at West Point in March, 1908. He graduated from the Military Academy in

MAJOR HOWARD SHARP BENNION

June, 1912, at the head of his class; he graduated also at the head of his class from the Army Engineer School at Washington in April, 1915. After six months service in Texas he served one field season in the Philippine Islands as assistant and one season in charge of the military survey in Luzon. With America's entry into the World War in 1917, he was ordered from the Philippines to France in command of the First Battalion, Second Engineers, of the Second Division. Arrived in France he promptly was relieved of this assignment and placed in charge of the newly constituted camouflage service. He held that job until after the armistice and for his work in the camouflage section subsequently received the Distinguished Service Medal. For his work as district engineer in charge of roads in the battle areas after the armistice Major Bennion was honored by France with membership in the Legion of Honor. After his return from France at the end of 1919 he was placed in charge of the division of engineer supplies in the office of the director of sales of the War Department. When the Federal Power Commission was organized in 1920 he was appointed assistant chief engineer, a position he held for four years. In September, 1924, he was appointed district engineer of the Fourth Mississippi River District at New Orleans in charge of levee construction and bank protection works on the Mississippi from Vicksburg to the Head of the Passes, and in charge of levee construction on the Atchafaluga. Major Bennion has resigned from that work to join the N.E.L.A. staff.

Ray Hammatt, who has had charge of collections in Contra Costa County, Calif., for the Great Western Power Company for the past five years, has been made district agent.

C. E. Patterson, vice-president of the General Electric Company in charge of merchandising, with headquarters in Bridgeport, Conn., recently spent some time in San Francisco. Mr. Patterson has been making a tour of the Pacific Coast, accompanied by **Julius Tuteur,** president, Electric Vacuum Cleaner Company. A number of dinners and luncheons were tendered Mr. Patterson during his visit to San Francisco at which he was given an opportunity to meet with and discuss merchandising problems before a large number of people interested in this phase of the industry.

J. H. Anderton of Thebo, Starr & Anderton, San Francisco, who has been in Japan for the past three months on company business, has returned to that city.

T. L. Rosenberg, of the Rosenberg Motor Company, Oakland, Calif., was congratulated by his fellow members of the Oakland Electric Club at a recent meeting upon having been elected a member of the Hole in One Club of that city.

Louis F. Leurey, consulting electrical engineer, San Francisco, recently appeared as a witness for the Pacific Gas and Electric Company at the hearing being held before the California Railroad Commission in connection with the valuation of that company's distribution system in San Francisco.

Edwin Bowen and **G. D. Smith,** both steam engineers for the Los Angeles Gas and Electric Corporation, have been retired to enjoy the pensions to which their years of service entitle them. Mr. Bowen retires after sixteen years of continuous service while Mr. Smith has been with the corporation for eighteen years.

Paul R. Prietsch, assistant to **R. W. Murphy,** Pacific Coast manager, Westinghouse Lamp Company, San Francisco, recently paid a two weeks' visit to southern California.

Eugene Logan, formerly of the engineering department of The Washington Water Power Company, Spokane, now consulting civil engineer of that city, recently has been retained to survey the Columbia Basin project in Washington.

M. Ready and **M. J. Selaya** of the Babcock & Wilcox Company have been conducting extensive boiler investigations in Southern California and at the present time are with the San Diego Consolidated Gas & Electric Company.

George J. Kraps and **H. T. Woodward** of the Southern California Edison Company, Long Beach, were visitors at San Diego not long ago and looked over the new installations at Station "B" of the San Diego Consolidated Gas & Electric Company.

William Channon of the Permutit Company, New York City, was recently in San Diego, as also were **D. P. Vail,** manager, C. C. Moore Company of Los Angeles, and **F. C. Church,** Fidelity & Casualty Company of Los Angeles.

John V. Strange, formerly assistant general manager, Pacific Power & Light Company, Portland, who is now operating manager of Carolina Power & Light Company, Raleigh, N. C., was a recent visitor in Portland.

J. F. Pollard, vice-president and general manager, Coast Valleys Gas & Electric Company, Salinas, Calif., paid a short visit to San Francisco not long ago.

L. M. Cargo, manager of the Denver office of the Westinghouse Electric & Manufacturing Company, recently spent two weeks covering the Salt Lake City territory of the Westinghouse company.

Henry W. Burritt, formerly tax attorney for Henry Ford and later president of the Gray Motor Company, Detroit, is the new president and general manager of the Leonard refrigerator Company, Grand Rapids, Mich.

D. A. Smith of the **Graham-Reynolds Electric Company,** Los Angeles, has been made purchasing agent of that organization.

Ray S. Quick, formerly sales engineer with the Pelton Walter Wheel Company, San Francisco, recently has received an appointment to the engineering staff of that company. Following his graduation from the University of California, class of '16, with the degree of B.S. and E.E., Mr. Quick became a Research Fellow in the Engineering Experiment Station at the University of Illinois, completing a year's work in that institution and receiving his M.S. degree. During his undergraduate period Mr. Quick was elected to Tau Beta Pi and Sigma X. membership. He served two years in the World War as a lieutenant in the Signal Corps, U.S.A., and following that he became associated with the Pelton Water Wheel Company. Mr. Quick is an active member in the American Society of Mechanical Engineers, the San Francisco Engineers' Club, and the Pacific Coast Electrical Association. During recent committee

RAY S. QUICK

membership in the latter organization he has done notable work in a study of comparison and limitations of existing water hammer formulas.

Obituary

Hyrum C. Johanson of Logan, Utah, salesman for the Intermountain Electric Company of Salt Lake City, was killed in an automobile accident Sept. 1.

Bertram J. Noll, Tacoma, Wash., electrical contractor, died in that city on July 30, at the age of 51. He was associated in contracting work with his son, **Bertram F.**

TRADE NOTES

The Monarch Fuse Company, Inc., of Jamestown, N. Y., has announced the purchase of the **Kilark Electrical Manufacturing Company,** makers of the Kilark Non-refillable Fuse, located at St. Louis, Mo. On the Pacific Coast this company is represented by the **Electrical Specialties Company** of San Francisco, Los Angeles and Seattle.

C. J. Thelan, formerly connected with the **Wholesale Electric Company,** has just opened an establishment for jobbing and wholesale business in electrical supplies and fixtures under the name of the **Thelan Electric Supply Company,** located at 1066 Howard Street, San Francisco. Ample storage and service facilities have been provided in the new enterprise for the many lines carried, it was announced by Mr. Thelan.

Copeland Products, Inc., Detroit, through George W. Mason, vice-president and general manager, has announced that it estimates its business in electrical refrigerators for 1927 will quadruple that of 1926 and already it is laying plans for increasing production facilities. Additional modern equipment is being installed and the manufacture and assembling is being put on a progressive assembly basis which has been common practice in the automobile business for many years. The company recently brought out a new model electric refrigerator which sells for $215.

Rome Manufacturing Company, Rome, N. Y., is distributing a pamphlet on the Rome portable electric heater, which it designates "The aristocrat of the electric heater family." Special emphasis is laid on the quality of the standard heating element, which will be 600 watts, although 1,000-watt elements can be furnished when desired. The heater is made from brass and copper, is guaranteed perfect in workmanship, efficient in performance, and is listed at $12.50 with 1,000-watt element, nickel plated $13.50.

The Commercial Truck Company, Philadelphia, has purchased the assets, including machinery, equipment, trucks completed or party completed, parts, drawings, patterns, dies, etc., and all patents of the Electruck Corporation, manufacturers of electric street trucks, known under the trade name of the Electruck. Inquiries relative to the Electruck should be addressed to the Commercial Truck Company, 300 Hunting Park Avenue, Philadelphia, Pa.

Standard Electric Stove Company, Toledo, recently has added to its line a three-burner hot plate measuring 27 in. x 9 in., model No. 51. Each burner is 800 watt controlled by three-heat switch. It is made in black japan finish and retails for $18.

Bakelite Corporation, New York, has issued an attractive broadside emphasizing the permanent beauty, strength and endurance of its product and the ability of Bakelite to resist heat, electricity, chemicals and water. The illustrations are particularly pleasing.

Artistic Lighting Equipment Association is the new name of The National Council of Lighting Fixture Manufacturers chosen at its recent annual meeting. The slogan, "Decorate with Artistic Lighting Equipment" was adopted for general use. New by-laws and a code of ethics and fair trade practice were adopted, and the recommended four-year co-operative advertising and merchandising program unanimously approved.

The smoothness of the grass and the delicate tracery of the trees serve as a soothing background to the riotous blazer—and the man who coined that word "blazer" knew whereof he spoke—adorning the intent golfer in the foreground. The keen observer will note that the dashing little squares of color in the upper part of the costume are matched in more subdued fashion in the "plus fours" while the heraldic devices on the socks probably were taken from the family coat of arms. Solomon in all his glory had nothing on Lewis A. Lewis, sales manager of The Washington Water Power Company.

A. J. Lindemann & Hoverson Company, Milwaukee, Wis., is placing on the market its new L. & H. Electrics air heaters for use in the home, in offices, theatres, box offices and the like. Each is made of steel with cast-iron legs and attractively finished in antique brass. These heaters are made in two sizes, a 16-in. and a 28-in. The smaller type is made for 115-125 volts and can be had in 1,000, 2,000 and 3,000-watt sizes. The same sizes are built for 220-230 volts also for these three wattages. The large air heaters are built for 220-230 volts only, made to consume either 4,000, 5,000 or 6,000 watts.

The Ohio Brass Company, Mansfield, Ohio, now is distributing its new No. 20 O-B general catalog. This book of 945 pages, exceeding the previous edition by 175 pages, includes complete listing of all O-B porcelain insulators, trolley and line materials, rail bonds, car equipment and mining materials. It is logically divided and thumb-indexed for the well defined classes of products of this company. In addition to descriptive and listing information, there are many helpful suggestions for the man concerned with the installation of these products. All of the material pertaining to porcelain insulators and hardware, and other pertinent data, 472 pages, also are being distributed in a separate binding, known as the Insulator Section. This special binding is for the convenience of those interested in the high-tension materials only. The books are indexed carefully and convenient cross-references are plentiful.

The Plibrico Jointless Firebrick Company, Chicago, is manufacturing Plibrico stucco, a new refractory used for the maintenance of brick or monolithic furnace walls and of arches. It is applied to the wall or arch as often as the boiler comes off the line, replacing that part of the furnace wall that has been eaten away during the last service period. Plibrico stucco can be used only where very high furnace temperatures are obtained.

The Liberty Gauge & Instrument Company, Cleveland, has added to its line of electrical appliances the Liberty heat-controlled automatic iron. This iron has an exceedingly accurate thermostat of special design and construction which maintains a constant, even, ironing temperature, according to the manufacturer. The thermostat is governed only by the temperature at the sole plate. When standing on its heel-rest the temperature is maintained within 10 deg. Other features claimed for the Liberty automatic are its cool handle, its convenient heel-rest, its tapered point and its proper distribution of weight and perfect balance. The thermostat, element and terminal prongs are assembled as an integral unit. Both sole and pressure plates are cast in virgin metal. Cover, heel-rest and guard are 18-gage cold-rolled steel; highly nickeled with ebony finished wood handle; capacity 660 watts, 110 volts, a.c. current only; weight, 6 lb.; intended retail price, $7.35.

George W. Dunham Corporation, Utica, N. Y., has announced through **Frank E. Cronan,** its Pacific Coast representative, that the **Fobes Supply Company** of Seattle, Wash., and Portland, Ore., has been appointed distributors of the Whirldry washing machine for those territories.

The Cutter Company, Philadelphia, has issued an interesting little booklet, "This Is the Age of the Specialist," dealing with circuit breakers and circuit breaker problems.

Edison Electric Appliance Company, Inc., Chicago, has published a catalog supplement covering a group of new Hotpoint electric appliances just announced to the trade. These include new paneled eight-cup urn, new five-cup paneled percolator, popular-priced waffle iron, small round tray, and combination of waffle iron and tray, at $31, $24.25, $10.50, $1.35 and $11.50, respectively, list.